duke environment

NICHOLAS SCHOOL OF THE ENVIRONMENT AND EARTH SCIENCES

Fall 2006 Honor Roll Issue

The Duke Forest at 75
A Bustling Hub of Research, Teaching and Recreation
An Ongoing Story of
Growth, Change and Adaptation
Norm Christensen’s Professional Path to Ecology
Followed Many Twists and Turns
7 The log school news
Migratory Mysteries of Endangered Sea Turtles
Cindy Van Dover Named Director of Duke Marine Laboratory
Global Warming May Increase Poison Ivy’s Itch
Ancient and Modern Evidence Suggests Limits to Future Global Warming ... and more

25 Forum dean’s page
Too Many Mouths to Feed?

26 Action student news
The Spinetail and the Antbird
Room for the Jaguar?

30 Scope faculty and staff notes

34 Sightings alumni profile
A Tale of Two Foresters
Graduating 53 Years Apart, Randy Boggess and Paul Trianosky are Sterling Representatives of Their Classes at Duke

alumni news
The Business of Reducing Global Warming
Career Matters: Online Applications . . . How Do I Get Onboard?
DEL Class Schedule

class notes obituaries

44 Nature and Nurture giving news
Benenson Gives $92,000 to Support Nicholas School’s Undergraduate Education
Explorers Gift Club Helps Celebrate Duke Forest Anniversary
The Financial Aid Initiative
2005–2006 Annual Fund Honor Roll

48 Update annual report

49 Monitor upcoming events

Decorate your desktop with nicholas school wallpaper, see page 6
An Ongoing Story of Duke Environment

Like the forests he studies, Norman L. Christensen Jr.’s career is an ongoing story of growth, change and adaptation.

Christensen is professor of ecology and founding dean of the Nicholas School. He’s widely regarded as one of the nation’s top experts on the role of fire, land use and other natural and human disturbances in forest ecosystems. Respected for his scientific integrity, admired for his devotion to students and universally liked for his collegial style of leadership, he has earned a reputation as a humble but highly effective environmental statesman—a consensus builder who rarely seeks the spotlight but whose words and actions carry weight.

Yet despite his sequoia-like stature in the field, Christensen didn’t set out to become an ecologist. Indeed, the professional path he has followed over the last 40 years has, at times, involved nearly as many twists as the Sierra Nevada back-country trails he hiked as a lanky, introverted teen growing up in Fresno, Calif., in the 1960s.

“I enrolled in college thinking I’d become an English major,” he recalls of his early days at California State University. “I loved literature and thought I might want to be a writer. It wasn’t until after my freshman year turned out to be a complete academic disaster that I realized my talents were better suited elsewhere.”

What ultimately sparked his interest in environmental science, he says, was taking a plant ecology class in his sophomore year in which students witnessed experimental burning in a giant sequoia forest.

“The idea that fire, in some contexts, might be a good thing—an essential thing—fascinated me,” he says. “It was the root of my interest in the kind of ecology I still study today.”
Inspired by what he learned that year, Christensen set his sights on a career in forest ecology. He earned a bachelor’s degree and master’s degree in biology from Cal State in 1968 and 1970, respectively, and, in 1973, a doctoral degree in biology from the University of California, Santa Barbara.

It was the heyday of the environmental movement, and California, by all accounts, was its epicenter. The opportunities for a freshly minted PhD in ecology to make his mark seemed limitless. But then Christensen’s career took another fateful turn. With Portia, his wife of five years, at his side, he headed east, leaving behind the environmental promised land of the West for a new job as assistant professor of botany at Duke University.

“It was an easy choice,” Christensen says. For a young ecologist fascinated by the study of forest disturbance and change, the southeastern landscape presented a world of new and exciting research opportunities.

“Much of the Southeast’s native forests were cleared in the middle of the 18th century for agriculture,” he explains. “When land is cleared for farming, very few legacies of the site’s original forest population remain. There’s no seed pool left in the soil. All the wood debris and much of the organic matter that was part of the native forest is lost. Everything is removed aside from the soil itself, and even that may be substantially altered.”

After tracts of this farmland were abandoned 50 to 100 years ago, the land reverted back into what scientists call old-field forests. In the mountains and piedmont, stands of fast-growing, wind-dispersed species such as sweet gums, pines and tulip poplars sprang up. Animal-dispersed species like hickory and oak returned, too, but at much slower
rates and in smaller numbers. On the coastal plain, decades of wildfire suppression had allowed a growth of scrubby species to overrun the remnants of native longleaf pine forests. The face of the Southeast’s landscape had changed, not once but twice, in relatively short order. It was an environmentalist’s nightmare. And a researcher’s dream.

Christensen set out to discover what the effects of these changes were, not just on trees themselves but on entire forest ecosystems.

Working with students and faculty from Duke, the University of North Carolina at Chapel Hill and other universities, he established a network of 193 new experimental research plots, representing a wide range of forest types, forest ages and soil conditions. Each plot measured one-tenth of a hectare, or about a quarter of an acre. Many were located in Duke Forest.

Being able to re-sample permanent plots originally established in the 1930s by Duke Forest’s founding director Clarence Korstian was vital to the project’s success, Christensen says. “Having access to 75 years of detailed records on the history of research in that forest created a whole set of opportunities for us to document the effects of change that occur over decades or even longer. That’s a rare thing to be able to do in forest ecology.”

By 1977 the network was complete, and team members began measuring the growth of individual trees and herbaceous plants on each plot, meticulously documenting changes in size, leaf area, extent of cover, population density and species diversity, as well as sampling and recording any changes in the plots’ soils.

“It sounds complicated, but it’s not that different from measuring a child’s height from year to year on the back of a closet door,” Christensen says. “Individual measurements aren’t that significant. What matters is the rate of growth—how they fare from one measurement to the next.”

Christensen’s goals were to document the variability that existed in southeastern forests; to measure the speed and extent to which changes were occurring in the forests; and—if possible—to determine which changes were attributable to the process of succession that resulted from past human disturbance, and which changes were occurring independently of them.

As the volume of sampling data grew, some surprising answers began to emerge.

Forest productivity was found to be remarkably similar between most old-field forests and natural ones, although the hardwood species most commonly found in old-field forests were quite different from the hickory or oak found in natural stands. “These differences have both economic and ecological consequences,” Christensen says.

Differences documented in forest populations and ecosystem health were more significant. A rampant deer population and the suppression of wildfires were having profound impacts on the spread of invasive species such as European privet. The consequences and extent of these disturbances varied from site to site, but they underscored a near-universal maxim: once disturbed, a forest ecosystem tends to be more susceptible to further disturbances as it matures. Change begets change.

“A hurricane, for instance, could be viewed as a random, independent disturbance, but the effects it will have on an ecosystem very much depend on disturbances that have taken place in that ecosystem in the past,” Christensen says. “These will affect how the ecosystem changes and recovers after the winds and waters recede.”

The impact of climate change may have similarly far-reaching repercussions,
he warns. “Summers have been warmer and growing seasons have been longer. We expect these changes to have cumulative effects on the forest over time.”

Fellow ecologists credit Christensen’s work with reshaping how they view the complex and often contentious issue of human impacts on forests.

“The importance of history and human impact on ecosystems is underappreciated by most ecologists. Given the complexity and diversity of human impacts, it is tempting to avoid coming to grips with the topic at all. Norm recognized this problem and the singular importance of looking at the ecological pattern on the landscape as the results of historical contingencies and past events,” says Christensen’s longtime research colleague Robert K. Peet, professor of ecology at UNC-Chapel Hill. “He has been a central figure in bringing the ecological community together to contribute to major ecological issues of importance to society.”

In particular, Peet says, Christensen’s work on the impact of human disturbance in forests of the southeastern coastal plain “is the first and still the clearest and most complete assessment of this understudied but critical eco-region.”

Outside the Southeast, Christensen has applied his team’s research findings to many of the nation’s most pressing environmental issues. He has served on numerous national, regional and local science and policy task forces, including high-profile stints on the U.S. Nuclear Waste Technical Review Board, the National Commission on Sustainable Forestry and the National Academy of Sciences Committee on Environmental Issues in Forest Management in the Pacific Northwest. In 2003, he testified before Congress about improvements needed to the Healthy Forest Restoration Act. The act removed administrative barriers to cutting timber on fire-prone public lands, ostensibly to reduce fuel loads.

Conciliatory by nature, he can nonetheless be a fearless advocate for the responsible stewardship of natural resources. Few issues have engaged him as passionately as the management of public lands in his native West.

“Norm has contributed heavily to developing fire policies for public lands,” Peet says. “He was perhaps the major figure in the re-evaluation of fire policy by the National Park Service following the Yellowstone fires” of 1988.

“Decades of mismanagement have helped fuel the intensity, frequency and destructive power of wildfires we’re seeing in western forests today,” Christensen says. “Plans to fireproof the West through fire suppression, logging and allowing grazing on fire-prone public lands have failed. Many forests are now more flammable, and urban encroachment extends right up to, and sometimes into, their borders, putting people and property in harm’s way.”

Christensen’s calls for new management practices have repeatedly landed him in the national media spotlight and sometimes have drawn the ire of industry executives, developers and environmental extremists. (“Sometimes they say I’ve gone too far,” he says with a shrug. “Sometimes they grumble that I don’t go far enough.”) He tries to take it all with a grain of salt.

“I don’t seek out controversy, but I don’t shrink from it either,” he says.

It was his personal sense of responsibility and “parentship” on issues relating to the environment and education that led Christensen in 1991 to take on the greatest challenge of his career so far as founding dean of Duke’s new School of the Environment.
“Being named dean was a transforming moment,” he says. “I am eternally grateful for the opportunities it gave me. Aside from the thousands of students I’ve had the pleasure of teaching or working with over the years, it’s what I’m most proud of.”

His pride is justified. During his decade in office, Christensen oversaw a period of enormous growth and change. His administration’s accomplishments include the construction and occupation of new space in the Levine Science Research Center; large increases in the size of faculty, research funding and the school’s Master of Environmental Management program; the creation of the Coastal Environmental Management program and two undergraduate majors; growth in the school’s endowment from less than $5 million to more than $94 million; the establishment of 11 new endowed faculty chairs; and greatly increased national and international recognition for the school’s programs and faculty.

After stepping down as dean in 2001, Christensen returned to the faculty as professor of ecology. Although he admits to sometimes missing “the adrenaline rush” of deanship, the “so-called slower pace” of being a faculty member suits him just fine.

“I have more time now for things I had to put aside as dean,” he says. Among other pleasures, that means catching up with former students; spending lazy weekend mornings watching flocks of brightly colored goldfinches and tanagers congregate around the bird feeders in his heavily wooded backyard, reading the works of Gabriel Garcia Márquez and other favorite Latin American authors, and making up for lost time on his guitar.

“I’ve played guitar since I was a teenager, but it sort of fell by the wayside during my dean years,” he says. “In the past five years I’ve become much more serious about playing again.” His dream, he says, would be to play “like a mixture of Doc Watson, Eric Clapton and Chuck Berry, with a little of (classical guitarist) Christopher Parkening thrown in for good measure.”

More than anything, though, when Christensen talks about having time for the things he loves, he means spending more time with Portia, his beloved wife of 39 years, their two grown children, Jamie and Mary, and Jamie’s son and daughter. “Portia and the kids are the most important things to me in the world,” he says simply.

But don’t get the wrong impression. Christensen isn’t ambling off into the western sunset just yet.

Today, after 33 years on the Duke faculty, he’s busy taking on new challenges. Working with students, he’s resumed research at many of the experimental plots he established 30 years ago. He’s become executive director of the Duke Environmental Leadership Program, the Nicholas School’s master’s program for mid-career professionals. Last fall, he began teaching the school’s introductory undergraduate course in environmental science, an experience he describes as “great fun.” And this August, he began a three-year cycle as president of the 9,000-member Ecological Society of America, laying out an ambitious agenda for the society to beef up its efforts to support ecological research, outreach and education.

“Sometimes, it feels like I’m busier than ever,” he says. “But I’m not complaining. Keeping busy is good. I’m grateful for the opportunities Duke University and the Nicholas School have provided me to make a difference in the world.”

Tim Lucas is the Nicholas School’s national media relations and marketing specialist.

Web Sites to Note
Norm Christensen bio
www.nicholas.duke.edu/people/faculty/christensen.html

Duke Environmental Leadership Program
www.nicholas.duke.edu/del/

Ecological Society of America
www.esa.org/

Healthy Forests Restoration Act Testimony
www.nicholas.duke.edu/people/faculty/news/HR1904_testimony_Christensen.pdf

Download your wallpaper now
www.nicholas.duke.edu/wallpaper

New Grant Will Help Nicholas School Researchers Uncover Migratory Mysteries of Endangered Sea Turtles

An international team of scientists led by Michael Coyne, research scientist at the Nicholas School, has received a $460,990 grant to fund a two-year project to track the migration of endangered Atlantic loggerhead and leatherback turtles.

The grant was awarded to Coyne and his colleagues by the University of New Hampshire Large Pelagic Research Program, which is funded by the National Oceanic and Atmospheric Administration.

“This grant will allow us to conduct satellite tracking of these endangered turtles on a scale previously not possible,” says Coyne, who is a member of the Nicholas School’s Marine Geospatial Ecology Lab faculty. “We’ll track 20 turtles with satellite tags this year and 30 next year—that’s double and triple the number we’ve been able to tag in past years.”

Information gleaned from the satellite tracking will shed new light on mysteries surrounding the species’ long-distance migrations and will help biologists and conservationists develop better strategies for managing and protecting the endangered turtles as they crisscross international waters on their annual treks.

To track the animals, Coyne and his associates will attach satellite transmitter tags to the shells of loggerhead turtles at Cape Verde, a group of islands located off the African coast west of Senegal, and to shells of leatherback turtles in the equatorial waters of the Gulf of Guinea, in the west central African nation of Gabon.

Co-investigators on the new grant are Patrick N. Halpin, Gabel Associate Professor of the Practice of Geospatial Analysis at the Nicholas School; Brendan Godley, director of the Marine Turtle Research Group at the University of Exeter; and Michael Fedak of the Sea Mammal Research Unit at the University of St. Andrews.

Earlier this year, the research team published findings from a two-year study that used satellite-tracking systems to follow the journeys of 10 turtles from Cape Verde. The study, which was published in May in the journal Current Biology, could turn current conservation strategies upside down, Coyne said, because it contradicts a long-held assumption that loggerhead hatchlings migrate into the open ocean to forage, while adults of the species return closer to shore to hunt for food.

By tracking the turtles for up to two years over ranges that covered more than a half-million square kilometers, the researchers discovered that many of the turtles continued to forage in the deep sea even as smaller, breeding-age adults.

More information about tracking sea turtles is available online at www.seaturtle.org/tracking. The research team’s paper in Current Biology is online at www.current-biology.com/retrieve/pii/S0960982206013959.
Cindy Van Dover Named Director of Duke Marine Laboratory

Cindy L. Van Dover, associate professor of marine biology at the College of William & Mary, is the new director of the Duke University Marine Laboratory in Beaufort, NC, which is part of the Nicholas School.

Van Dover succeeds Michael K. Orbach, who is continuing on the school faculty as professor of the practice of marine affairs and policy, a position he has held concurrently with the marine lab directorship since 1993.

Van Dover, who specializes in the study of deep-sea hydrothermal vents and chemosynthetic communities, has received numerous honors for her research and teaching, including a Fulbright Research Scholarship in 2004, a National Science Foundation CAREER Award in 2000 and a William & Mary Alumni Fellowship Award for Outstanding Teaching in 2003.

In 2002, she was elected a Fellow of the American Association for the Advancement of Science. She has served as a scientist or submersible pilot on more than 100 dives to the bottom of the deep sea.

“I am honored to have the opportunity to lead the Duke Marine Lab and to build upon the strong foundation provided by Mike Orbach in his years as director,” Van Dover said.

“As a coastal facility within the Nicholas School, the Marine Lab is renowned for the strength of its research and its PhD and professional graduate degree programs. It also is ideally situated for training undergraduates in marine conservation and science,” she said.

Officials said Van Dover’s selection, following a national search, comes at a critical time for the Marine Lab’s development.

“These are exciting times at the Marine Lab,” said William H. Schlesinger, dean of the Nicholas School. “Cindy Van Dover convinced all of us in the search process that she has a special combination of skills, scholarship and vision to lead the lab as it expands its mission and tackles new challenges and opportunities in the years to come.”

Duke Provost Peter Lange, the university’s chief academic officer, added, “I am confident that under Professor Van Dover’s leadership, the Marine Lab will continue to evolve and grow as a world-class research and teaching campus.”

Van Dover received a doctoral degree in biological oceanography in 1989 from the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution Joint Program. She received a master’s degree in ecology in 1985 from the University of California at Los Angeles and a bachelor’s degree in environmental science in 1977 from Rutgers University.

She has been on the faculty at the College of William & Mary in Williamsburg, Va., since 1998, and has taught or conducted research at numerous other top marine science institutions, including Woods Hole, the Oregon Institute of Marine Biology at the University of Oregon and the Institute of Marine Science at the University of Alaska-Fairbanks.

Her appointment as director of the Duke Marine Lab represents a home-coming of sorts: In 1994-95, she served as Mary Derrickson McCurdy Visiting Scholar at the lab and, in the late 1970s, she worked as a technician there after graduating from Rutgers.

“Through education and research, the Marine Lab contributes to the resolution of national and global issues in marine ecosystems,” Van Dover said. “It will be a privilege to work with the lab’s faculty, Dean Schlesinger and the Duke administration to accomplish an ambitious agenda for the lab.”
Global Warming May Increase Poison Ivy’s Itch

Nicholas School scientists have found another problem linked to rising carbon dioxide levels in Earth’s atmosphere: It’ll make you itch more.

In a study published in Proceedings of the National Academy of Sciences in May, the researchers reported that poison ivy not only grows faster in a carbon dioxide–enriched atmosphere, but it also produces more urushiol, the chemical substance that causes the noxious vine to give most people a nasty rash. The lead author was Jacqueline Mohan, a recent doctoral graduate of the Nicholas School who is now a postdoctoral scientist at the Ecosystems Center of the Marine Biological Laboratory at Woods Hole, Mass. James S. Clark, H.L. Blomquist Professor of Biology at the Nicholas School, and William H. Schlesinger, dean of the Nicholas School and James B. Duke Professor of Biogeochemistry, were co-authors.

Mohand and her co-authors conducted the study over six years at the Free-Air Carbon Dioxide Enrichment (FACE) site in Duke Forest, where carbon dioxide is dispersed into the air at levels similar to those predicted to occur on Earth in 2050.

They found that poison ivy vines in the CO₂-rich area grew 149 percent faster and produced a concentration of urushiol that was 153 percent higher than vines grown in control plots.

The rampant growth bodes ill not only for human health but also for the health of forests, which some scientists believe are already suffering because of a proliferation of vines that rob slower-growing trees and woody plants of available light, nutrients and water.

The paper garnered international news coverage for the Nicholas School in The New York Times, the Washington Post, the Associated Press, NBC’s “Today Show” and more than 250 other major media outlets.

Birds Going Extinct Faster Due to Human Activities

Human activities have caused some 500 bird species worldwide to go extinct over the past 500 years, and 21st-century extinction rates likely will accelerate to approximately 10 additional species per year unless we take action to reverse the trend, according to a new report.

Without the influence of humans, the expected extinction rate for birds would be roughly one species per century, according to Stuart Pimm, Doris Duke Professor of Conservation Ecology at the Nicholas School, who is one of the report’s principal authors.

“What our study does, for the first time, is provide a well-justified and careful estimate of how much faster bird species are going extinct now than they did before humans began altering their environments,” said Pimm, whose research group pioneered the approach of estimating extinction rates on a per-year basis.

“Habitat destruction, selective hunting, invasive species and global warming are all affecting natural populations of plants and animals adversely,” added Peter Raven, president of the Missouri Botanical Garden, who is co-principal author of the report and a longtime collaborator with Pimm.

The report appeared in the online edition of Proceedings of the National Academy of Sciences during the week of July 3-7. Other authors are Alan Peterson, a physician in Walla Walla, Wash., and Paul Ehrlich and Cagan Sekercioglu, conservation biologists at Stanford University.

The new assessment considerably exceeds previous scientific estimates that 154 bird types disappeared during the past 500 years, according to the researchers.

The news is not all bleak, Pimm said.”The good news in this report is that conservation efforts are reducing extinction rates to about one bird species every three or four years,” he said, but he added that even this improved rate “is still unacceptable.”

Get the complete story by Monte Basgall of Duke News and Communications at www.dukenuews.duke.edu/2006/07/nobirds.html
Ancient and Modern Evidence Suggests Limits to Future Global Warming

Instrumental readings made during the past century offer ample evidence that carbon dioxide and other “greenhouse gases” in the atmosphere are warming Earth’s climate, a team led by Duke University scientists has reported. But by analyzing indirect evidence of temperature fluctuations over six previous centuries, the team also found that the magnitude of future global warming may fall short of some of the current highest predictions.

In making their deductions, the researchers ran some 1,000 computer simulations, covering 1,000 years, that took into account a range of modern and ancient climate records. Modern records are based on thermometer readings, while measurements derived from such sources as tree rings and ice cores served as markers of warm and cold spells over prior centuries.

The investigators evaluated the data using an “energy balance model” that they describe as a slimmed-down version of the heavy-duty computer models typically used to analyze climate trends. It is the model’s streamlined nature that enabled the researchers to perform such large numbers of simulations over such a long period in such detail, they said.

The group used thousands of different versions of this model, each version varying in some of its properties, in order to determine which variants best matched actual observations. One key property that varied was what the researchers termed “sensitivity”—that is, how much the simulations’ temperatures would change in response to increasing greenhouse gas levels.

“What I can say very confidently is that the present-day sensitivity is not zero, meaning that there is a positive, warming response to greenhouse gases,” said climate analyst Gabriele Hegerl, an associate research professor at the Nicholas School. “Our work also substantially reduces the probability of very high climate sensitivities.”

Hegerl is lead author of the study, published April 20 in the journal Nature. Her co-authors are Thomas Crowley, Nicholas Professor of Earth Systems Science; William Hyde, a former Nicholas School research scientist now at the University of Toronto; and David Frame, a researcher at the University of Oxford.

Their work was supported by the National Oceanic and Atmospheric Administration, the U.S. Department of Energy and the National Science Foundation.

Many scientists expect that sometime this century the level of carbon dioxide in the atmosphere will reach double the levels that were present during preindustrial times. Because carbon dioxide traps outgoing heat energy similarly to the glass in a greenhouse, the additional human-created outputs of the gas—mostly from fossil fuel burning—are expected to warm Earth’s climate. The key question is: By how much?

The commonly accepted range for how high average global temperatures will rise in response to a doubling of atmospheric carbon dioxide is between 1.5 degrees and 4.5 degrees Celsius, according to the researchers. But some observational studies, they noted, suggest the possibility that average temperatures might rise more than 9 degrees.

However, the new study—using reconstructions of Northern Hemisphere temperatures since the year 1270—indicates a 90 percent probability that a doubling of carbon dioxide levels will result in temperature increases of between 1.5 degrees and 6.2 degrees, the team reported.

In turn, the study showed a smaller chance that the actual maximum increase will exceed 4.5 degrees—“from 36 percent to 15 percent or less,” the researchers said. A 4.5-degree increase is the highest maximum currently predicted by the international Intergovernmental Panel on Climate Change.
More Carbon Dioxide May Help Some Trees Weather Ice Storms

The increased levels of carbon dioxide in the atmosphere predicted for later this century may reduce the damage that future ice storms will cause to commercially important loblolly pine trees, according to a new study.

Researchers working at the Free-Air Carbon Dioxide Enrichment (FACE) site in Duke Forest found that loblolly pines growing under carbon-dioxide levels mimicking those predicted for the year 2050—roughly one and a half times today’s levels—fared somewhat better during and after a major ice storm that hit the area in December 2002 than did loblollies growing under current concentrations of the gas.

“Before the storm, I was absolutely certain the pines would be more susceptible to ice damage under elevated concentrations of carbon dioxide,” said Ram Oren, professor of ecology at Duke’s Nicholas School who directs the test site and participated in the study. “My impressions were absolutely wrong,” he said. “Instead of increasing the sensitivity to ice storm damage, carbon dioxide decreased the sensitivity.”

The researchers reported the findings Aug. 8 in the *Journal of Geophysical Research*. Heather McCarthy, a Nicholas School graduate student, is first author. The study was funded by the U.S. Department of Energy and the USDA Forest Service.

“These results suggest that forests may suffer less damage during each ice storm event of similar severity in a future with higher atmospheric carbon dioxide,” the researchers said.

The test results may hold meaning for the future of commercial pine forests in the Southeast, Oren said. If future studies confirm the findings then this might generate future scenarios in which loblollies could actually migrate farther north,” he said. Ice storms now are major barriers to the northward migration of loblollies, which are susceptible to cold temperatures and ice damage.

Other researchers who participated in the study include Hyun-Seok Kim of the Nicholas School; Kurt Johnson and Chris Maier of the USDA Forest Service’s Southern Research Station in Research Triangle Park, N.C.; Seth Pritchard of the College of Charleston in South Carolina; and Michael Davis of the University of Southern Mississippi in Hattiesburg.

Get the complete story by Monte Basgall of Duke News and Communications at [www.dukenuews.duke.edu/2006/08/icepine.html](http://www.dukenuews.duke.edu/2006/08/icepine.html)
A Presence in the Capitol
Nicholas Institute Launches DC Office to Build New Environmental Bridges to Opinion Leaders and Decision Makers

The Nicholas Institute for Environmental Policy Solutions is launching its presence in Washington, D.C., on Nov. 16.

The launch kicks off with a day of events, news announcements and bipartisan policy discussions designed to highlight the institute’s mission as “a convener of new ideas,” says Director Tim Profeta.

“We're planning events that will bring together heavy hitters from business, government, think tanks, environmental NGOs and academia to demonstrate, in a substantive way, what the institute brings to D.C.,” Profeta says. “This is very much a working launch: Ceremonial frills are being kept to a minimum. We want decision makers to leave with the understanding that the Nicholas Institute is going to be a useful partner. It is a place they can turn to for policy analysis and framing that is timely, trustworthy and sharply focused on the issues that matter.”

Among other events, the day’s agenda will include workshops for congressional staff, corporate representative and others exploring new policy analysis on climate change solutions and new ways to approach governance of the oceans. It will culminate with a reception that features an intimate conversation between two luminaries of the political and corporate worlds discussing the potential economic and energy benefits of a carbon cap.

A complete listing of the day’s events, their locations and scheduled participants, along with the new office’s address and contact information, is available on the Institute’s Web site at www.nicholas.duke.edu/institute/dclaunch.html.

The launch continues on Friday, Nov. 17, with the Nicholas Institute Advisory Board’s private biannual meeting at the office.

“Having an office in D.C. has been an integral part of the board’s strategic vision for the institute since day one,” Profeta says. “It allows us to respond quickly and effectively to policymakers’ needs by bringing the broad environmental policy expertise of the institute, the Duke University community, and its partners directly to their doorsteps.”

Nicole St. Clair, a widely respected D.C.-based environmental policy communications veteran, has been hired as associate director of the new office to coordinate the institute’s outreach to policymakers and decision makers in the nation’s capital and to help integrate Duke’s faculty expertise into policy discussions there. She also is spearheading the institute’s outreach to national media.

“It’s an ideal time to launch the Nicholas Institute’s presence in D.C.,” she says. “The 2006 elections are over, and we’re moving forward as a nation to address issues of critical importance like national security, world stability, climate change and U.S. competitiveness in the new energy economy.”

This gives the institute a golden opportunity to build bridges to opinion leaders and decision makers beyond those traditionally aligned with the environmental camp, St. Clair says.

“Forging a new, bipartisan understanding of how sound environmental policies can play a pivotal role in achieving success on economic and security issues is one of our top priorities for the launch and in the coming year,” she says.

Prior to joining the Nicholas Institute staff this fall, St. Clair was director of communications for the Climate Campaign at Environmental Defense. In 2004 and 2005, she served in a similar capacity for the Natural Resources Defense Council. Before that, she was director of strategic communications for Ceres, a Boston-based coalition of environmental organizations and investment funds, where she worked with some of the nation’s largest institutional investors and major companies on the concept of “climate risk.” Her efforts at Ceres netted some of the first coverage of global warming in the nation’s financial press, as well as the engagement of Wall Street analysts in the issue and attention from Congress.

In addition to working with policymakers and the media, St. Clair is focusing her efforts on connecting with the thousands of Duke and Nicholas School alumni who work in the D.C. area. She invites them to take part in the launch and to remain actively engaged with the institute and its initiatives.

“We want to stake a claim for Duke University as a leader in bringing academic expertise to the national policy sphere,” St. Clair says. “Duke’s alumni network is one of the Nicholas Institute’s most valuable resources, and we’re going to work very hard to ensure that the institute becomes a resource for them, too.”
Woodrow Wilson National Fellowship Foundation Awards $508,050 to Nicholas School

The Nicholas School has been awarded a total of $508,050 from the Woodrow Wilson National Fellowship Foundation to renew and expand its Doris Duke Conservation Fellowship support for the current year and next two years of the program.

The fellowship identifies and supports future leaders dedicated to conserving the environment in the United States. The program, launched in 1997, originated with the New York City–based Doris Duke Charitable Foundation, which seeks to improve the quality of people’s lives by preserving natural environments, nurturing the arts, seeking cures for disease and helping to protect children from abuse and neglect.

Duke is among eight host universities participating in the fellowship program including Florida A&M University; Northern Arizona University; University of California, Santa Barbara; University of Michigan; University of Wisconsin–Madison; and Yale University.

Based on the size of the school’s student body, the foundation will provide funding to the Nicholas School for up to six fellowships in 2006–07 and in 2007–08. It also will award four additional fellowships each year to be divided among host schools, to promote diversity among the next generation of conservation leaders.

Fellows are selected by the host schools. Each fellow receives up to $31,000 to support tuition and a conservation research project or internship at a nonprofit conservation organization. In addition, the host university receives $5,000 to enhance career development programs.

To date, fellowships have been awarded to 66 Nicholas School students who are pursuing Master of Environmental Management or Master of Forestry degrees.

The Doris Duke Conservation Fellowship is open to individuals regardless of race, national origin, religion, age, disability, sexual orientation, ethnicity or gender. It encourages individuals from groups historically underrepresented in environmental conservation to apply.

This year’s fellows are listed below with their program of study at the Nicholas School and their internship organization. Additionally, these fellows have been awarded a $2,500 supplemental grant for their submitted proposal to create a leadership mini-course to be implemented in the spring of 2007.

- Miranda Smith, Charlottesville, Va., environmental economics and policy; NatureServe (Hawaii).
Nearly 50 Nicholas School faculty members and students presented findings from new research at the annual meeting of the Ecological Society of America (ESA), the year’s most important ecological science conference, held in August in Memphis, Tenn. Faculty or students from the school were listed as lead authors or co-authors on 24 papers, posters or symposia. Additionally, Norman L. Christensen Jr., professor of ecology and founding dean of the Nicholas School of the Environment and Earth Sciences, was sworn in as president of ESA at the meeting. Election as ESA’s president represents a three-year commitment, during which time Christensen will serve as president-elect, president and past president.

“Having a major presence at the ESA conference is a measure of the Nicholas School’s leadership in environmental science and policy,” he said. “It underscores the fact that no other school in the United States can offer the breadth of environmental expertise you will find here.”

Below is a list of the presentations authored or co-authored by Nicholas School or affiliated Duke University faculty members and students:

- “The Constant Light, Colder Nights Hypothesis on Breeding Timing in Tropical Birds,” by Jessica L. Hardesty
- “Evidence of Resource Partitioning and Niche Separation Between Humpback and Minke Whales in Antarctica,” by Ari S. Friedlaender and Gareth L. Lawson
- “Inter-specific Variation in Canopy Conductance With Tree Height,” by Kimberly A. Novick, Gabriel G. Katul, Jehn-Yih Juang and Mario Siqueira
- “Pastures to Plantations:Afforestation, Soil Microbes and Biogeochemistry in Temperate South America,” by Sean T. Berthrong and Robert B. Jackson
- “Bottlenose Dolphin Habitat Selection in Florida Bay Relative to Behavior, Habitat and Prey Availability,” by Leigh G. Torres and Andrew J. Read
- “Regional-scale Stressor Response Models in Aquatic Ecosystems,” by E. Conrad Lamon
- “Regeneration of Dynamics in Large Forest Gaps:Assessing the Importance of Resprouting,” by Michael C. Dietze and James S. Clark
- “Effects of Severe Ice Storms on Regional Carbon Storage in Biomass and Detrital Pools,” by Heather R. McCarthy and Ram Oren
- “Effects of Atmospheric Carbon Dioxide and Nitrogen Availability on Root Exudation in Loblolly Pine,” by Richard D. Phillips and Emily S. Bernhardt
- “The Role of Plant Species and Functional Diversity in the Restoration of Riparian Wetland Ecosystem Functions,” by Arianna E. Sutton-Grier and Justin P. Wright
- “Bird and Prey Community Response to Typhoon-damaged Tree Plantations and Natural Stands in Hokkaido, Japan,” by John H. Kim and Masashi Murakami
- “Presettlement Vegetation of the North Carolina Piedmont,” by Miguel J. Schwartz and Rebecca Dobbs
- “Directed Connectivity Among Fish Populations in a Riverine Network,” by Robert S. Schick, Steven T. Lindley, Patrick N. Halpin and Dean L. Urban
- “A Multilevel Model for Analyzing Zero-inflated Count Data,” by Song S. Qian and Valerie Hickey
- “Graph Models of Habitat Networks: Commonalities and Implications,” by Dean L. Urban, Emily S. Minor and Robert S. Schick
- “Three Time Scales for Understanding and Managing Soil Restoration,” by Daniel D. Richter
- “Effect of Density Dependence, Drought and Management Regime on an Insular Bighorn Sheep Population,” by Fernando Colchero, Rodrigo A. Medellin and Gabriel G. Katul
**SCHOOL NEWS**

**special awards recognize 2006 grads**

**Virlis L. Fischer Award**—Goes to the graduating professional degree student with the highest academic achievement. Given by Bernice Fisher in memory of her husband. This year two students tied for the award.

**Recipient: Sarah Borchelt van der Schalie**  
**Hometown:** Santa Cruz, Calif.;  
**Major:** MEM, Coastal Environmental Management;  
**Activities at Duke:** executive officer, Nicholas School Student Council, 2005–06; Duke Environmental Leadership Community Outreach Program, volunteer educator, spring 2005; participant, Research Triangle Universities Symposium on Environmental Conflict Resolution, winter, 2006;  
**Awards/Honors:** Doris Duke Conservation Fellowship for conservation leadership, Nicholas School merit scholarship and research assistantship;  
**Master’s Project:** Case Studies of Island Communities in South Carolina: An Examination of Coastal Green Development;  
**Post-Graduation Destination:** “I will be moving to D.C. in August to begin working for NOAA’s Coastal Programs Division as a coastal programs specialist.”  
**Future Goals:** “I plan to continue to work with coastal land-use planning and policy to design progressive initiatives that balance human needs with conservation of ocean and coastal resources.”

**Recipient: Nancy C.A. Young**  
**Hometown:** Indianapolis, Ind.;  
**Major:** MEM, Coastal Environmental Management;  
**Activities at Duke:** The Coastal Society;  
**Awards/Honors:** Nicholas School Merit Scholarship;  
**Master’s Project:** Guidelines for Developing a Potential Biological Removal (PBR) Framework for Managing Sea Turtle Bycatch in the Pamlico Sound Flounder Gillnet Fishery;  
**Post-Graduation Destination:** “I’ll be spending the summer working as a research technician on a commercial blue crab boat in Pamlico Sound, testing a gear modification for its potential to reduce interactions with sea turtles.”  
**Future Goals:** “I hope to find a permanent position in the field of protected species conservation and management.”

**Sara LaBoskey Award**—Given in recognition of personal integrity and academic excellence.

**Recipient: Charla Nichole Wilson**  
**Hometown:** Gilroy, Calif.;  
**Major:** B.S., Environmental Science and Policy;  
**Activities at Duke:** First Baptist Church ministry team; assistant researcher with the Children’s Environmental Health Initiative at Duke; Brownstone Selective Living Group; rowing;  
**Awards/Honors:** Cum Laude;  
**Post-Graduation Destination:** Teaching seventh and eighth grade general science at the Lincoln School in Guadalajara, Mexico;  
**Future Goals:** “I will either go on to further schooling in education or in environment. Regardless of which one I choose, I will always be passionate for seeing the conservative Christian church learn the importance of and support good stewardship on the environment.”

**Recipient: Melissa Rose Fiffer**  
**Hometown:** Howard Beach, N.Y.;  
**Major:** A.B., Environmental Sciences and Policy;  
**Activities at Duke:** Arts Theme House; Duke Recycles; Healthy Devil Peer Educators; Blue Ridge Environmental Defense League;  
**Awards/Honors:** Duke Undergraduate Environmental Leadership Award;  
**Post-Graduation Destination:** pursue the MEM in Environmental Health and Security at Duke;  
**Future Goals:** “I am interested in investigating the public health impacts of toxic air emissions, and the policy and legislative implications. Ultimately, I would like to go to law school and become an environmental lawyer, representing overexposed communities.”

**Estwing Award**—Given in recognition of outstanding achievement in the earth and ocean sciences.

**Recipient: Anne Jordan Zaino**  
**Hometown:** Hummelstown, Pa.;  
**Major:** B.S., Earth and Ocean Sciences;  
**Activities at Duke:** technical supervisor, set and sound designer for Hoof ‘n’ Horn; transfer advisory counselor (TAC);  
**Awards/Honors:** Graduation with Distinction*, Dean’s List with Distinction spring and fall 2004–05;  
**Post-Graduation Destination:** Durham, N.C., building seismometers for Sondi for geophysical research and hydrothermal power;  
**Future Goals:** “I plan to work for Sondi for the next year, then go to graduate school for structural geology.”

**Thomas V. Laska Memorial Award**—Given by the Earth and Ocean Sciences faculty to the most outstanding senior major.

**Recipient: Maiana N. Hanshaw**  
**Hometown:** Drumelzier, Scotland;  
**Major:** B.S., Earth and Ocean Sciences;  
**Awards/Honors:** Cum Laude, and Graduation with Distinction*;  
**Post-Graduation Destination:** “Tornado chasing for a month with the Center for Severe Weather Research, and then a summer internship at Woods Hole Oceanographic Institution.”  
**Future Goals:** “I’d like to be a research assistant, and then in a couple of years I plan to apply to grad school in either meteorology or oceanography.”

*Graduation with Distinction—Accords special recognition for academic excellence to students who successfully complete a significant independent research project on the environment or earth sciences.*
Stuart Pimm Receives 2006 Heineken Prize for Environmental Sciences

The Royal Netherlands Academy of Arts and Sciences has awarded the 2006 Dr. A.H. Heineken Prize for Environmental Sciences to Stuart L. Pimm, Doris Duke Professor of Conservation Ecology at the Nicholas School.

The award, which carries a $150,000 cash prize, is one of six Heineken Prizes presented biennially. Heineken Prizes are awarded in history, medicine, biochemistry and biophysics, environmental sciences, cognitive science, and art. They are among the most prestigious international awards presented in these fields.

In selecting Pimm for this year’s environmental sciences prize, the awards jury cited his “worldwide reputation” for conducting “influential” research on species extinction and conservation, and for tirelessly working to educate policymakers, the media and members of the public about the urgent need to conserve tropical rainforests and other threatened ecosystems.

Nicholas School Wins National Bronze Medal for Institute Launch Efforts

The Nicholas School’s marketing and communications team has won a national CASE bronze medal in the Year-Long Special Events category for “Launching the Nicholas Institute for Environmental Policy Solutions.”

The entry focused on the marketing and communications efforts, including 12 advertorials that ran in The New York Times and the Nicholas Notebook Web site, that preceded and immediately followed the launch in September 2005.

One gold medal, two silver and one bronze were awarded out of 15 entries. Cited were Scottee Cantrell, assistant dean for marketing and communications, Tim Lucas, national media relations and marketing specialist, Nancy Kelly, conference and events specialist, Amy Chapman Braun, art director, Stephanie Thirolle, Webmaster, and Donna Sell, communications assistant.

The Council for the Advancement and Support of Education is the international association of professionals who advance educational institutions.

Lisa Campbell Receives Universitywide Award for Excellence in Mentoring

Lisa M. Campbell, Rachel Carson Assistant Professor of Marine Affairs and Policy at the Nicholas School, has received a Dean’s Award for Excellence in Mentoring from the Duke University Graduate School.

The award recognizes faculty members for outstanding work in guiding graduate students, not just on academic issues but also on career, institutional and other topics.

Campbell is one of three faculty members universitywide who were selected by a committee of senior deans and graduate students to receive the honor. She and her fellow honorees received their awards, along with a $2,000 prize, at Duke’s annual Distinguished Teaching and Mentoring Award dinner.

Duke University Environmental Scientist Receives National Wetlands Award

Curtis J. Richardson, professor of resource ecology at the Nicholas School and director of the Duke University Wetland Center, has won the Environmental Law Institute’s 2006 National Wetlands Award for Science Research.

The Science Research award is one of six awards presented annually by the nonprofit institute to individuals who exemplify excellence and innovation in wetlands protection, restoration and education.

In selecting Richardson for the honor, the institute cited his “singularly impressive” contribution to wetlands science through research on wetlands loss and restoration in the Everglades; along the hurricane-ravaged Gulf Coast; in rapidly developing urban landscapes of North Carolina; in the heavily degraded Mesopotamian marshes of southern Iraq, which some scholars believe to be the site of the Biblical Garden of Eden; and in other threatened wetland ecosystems worldwide.

National Wetlands Awards are co-sponsored by the U.S. Environmental Protection Agency, the USDA Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, the Federal Highway Administration, the USDA Forest Service, and the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service.
Emily Bernhardt’s Pioneering Research Focuses on Successfully Restoring Urban Waterways
The subject is a mess. Her roots are showing. Her spine is flat. Her banks are covered with litter, much of it tossed from vehicles speeding by on Durham’s nearby Highway 75. Emily Bernhardt stands to one side of Mud Creek, clipboard in hand, and addresses her students.

“What do you see? Tell me what’s going on here?”

The words come out in a rush. Bernhardt is a fast talker. But delivered with an encouraging smile, her rapid-fire questions elicit an eager response.

“Erosion,” the students say. “The banks are incised."

“And what might be the cause of that?” Bernhardt asks.

“Excessive runoff, probably from all the development upstream.”

“Exactly.”

An assistant professor in the Nicholas School’s Environmental Sciences and Policy Division, Bernhardt is as comfortable in the woods as she is in the classroom or lab. She grew up in Lenoir, N.C., playing in a neighborhood stream and hiking in the Blue Ridge Mountains. Summers, she worked the cash register at her family’s hardware store, Bernhardt-Seagle, the oldest (1829) continuously operating store in the South.

“It was a good background for my current profession,” she says. “As an ecologist, you’re always building something.”

Bernhardt comes to Duke by way of the University of North Carolina at Chapel Hill, where she received a bachelor of science degree in biology, and Cornell University, where she earned a PhD in ecology and evolutionary biology. Her expertise is in linking geomorphic structure to biogeochemical functioning in stream and riparian ecosystems. Much of her current work is focused on assessing the health of streams that have been restored through re-engineering.

Stream restoration is a huge business in the United States, encompassing more than 100,000 projects nationwide at a cost of more than $1 billion per year. State and federal agencies, local governments and private organizations undertake restoration projects for a variety of reasons including enhancing water quality, managing riparian zones, improving in-stream habitat, easing fish passage and stabilizing banks.

Urban streams are often prime candidates for restoration. Many have been channelized—their banks straightened and hardened to control their course and to speed runoff—and have had their natural vegetation removed. Others, like Duke Forest’s Mud Creek, suffer from eroded banks and flattened, silt-laden beds due to surges of runoff from parking lots, streets and driveways.

Restoration typically involves removing containment walls, adding bends and boulders to vary the flow, and planting a buffer of native trees and grasses.

Proponents assume that once this process is complete, water quality will improve and the stream will support a wider diversity of life. In fact, scientists don’t know if that is the case for many projects.

In 2002, Bernhardt joined a team of investigators seeking to identify common elements of successful stream restoration projects. The National River Restoration Science Synthesis assembled data on some 37,000 projects around the country. To the investigators’ surprise, only 10 percent of these were undergoing any form of monitoring, and little if any of the information gathered was appropriate for assessing the ecological effectiveness of restoration activities.

“Usually, their evaluations were based on photographs of the sites,” Bernhardt says. “If there was any monitoring it was done by the people who undertook the project, so it could hardly be called objective.”

Bernhardt subsequently has acquired funding from the National Science Foundation, the North Carolina Water Resources Research Institute, and the North Carolina Ecosystem Enhancement Program to compare a series of degraded and restored urban streams to protected streams in the Raleigh-Durham area. She and her graduate students are assessing the ecosystem function of these streams. They are measuring the streams’ ability to remove nutrients, particularly nitrogen, and to retain and store carbon.
Bernhardt actively collaborates with faculty and students from the University of North Carolina and North Carolina State University who are analyzing the physical characteristics of these streams and the diversity of aquatic biota they support.

Her current funding should support this research for five years, but she would like to turn it into a long-term project to gather pre- and post-restoration data. A number of the degraded streams her lab studies are slated for restoration within the next year.

Bernhardt’s preliminary findings suggest that “restored” streams “may actually have lower habitat variability than either the degraded or reference sites.” She cautions, “When we engineer a system, we tend to want to control it, to fix its course. But streams are dynamic.

“Restoration itself can be a huge disturbance,” she adds. “In the projects we are working on, the existing vegetation was bulldozed, banks were re-graded and new vegetation is planted. We don’t know how long it takes for a stream to recover.” Consequently, it can be difficult to decide over what time frame restoration success should be judged.

Bernhardt remains a believer in stream restoration, but says researchers are a long way from understanding what works and what doesn’t. Ultimately, she hopes her research will produce information that will lead to more effective and efficient restoration designs.

Bernhardt is considered a pioneer in the growing field of stream restoration. She delivered a speech at the North Carolina Stream Restoration Conference in Charlotte in October. Her peers commend her both for her academic approach and cheerful personality.

“I’ve had great experiences working with Emily,” says Greg Jennings, director of the Stream Restoration Institute at NC State and a partner with Bernhardt on the NSF grant. “She’s easy to work with, very committed. She seems to be on her way to a great career.”

“Emily brings to the science a breath of fresh air,” says Dave Penrose, NC State professor of biology and former environmental biologist with the North Carolina Department of Environmental and Natural Resources. “Most of my study has been in narrow confines of restoration as it relates to the regulatory scheme. Emily is looking at it from a much broader perspective—the energy source that drives the whole ecology of streams.”

As a teacher, Bernhardt is known for her infectious enthusiasm, particularly her interest in bringing women into the field. “Emily is very much concerned with diversifying the profession,” says Nicholas School Dean William H. Schlesinger. “She projects a real can-do attitude toward all her students, and especially women.”

Bernhardt teaches an undergraduate course in Ecology and Evolution and a graduate course in Biogeochemistry.

“Each course presents its challenges,” Bernhardt says. “The undergraduate course has about 80 students, so it’s impossible to get to know everybody. I need to teach the whole of ecology in just 13 lectures, and get them excited without being able to take them outdoors. I try to start every class out with a case study that the students may have encountered before. For example, I showed a segment from March of the Penguins to demonstrate how complex life histories can be.

“With graduate students, the class is smaller and you can really dive into the subject,” she adds. “Plus there’s the opportunity to work in the field.”

John Manuel is a freelance writer in Durham, N.C.
Walking along the Bald Mountain Trail in Duke Forest, it’s easy to forget that you’re a short, four-lane commute from the heart of one of America’s fastest growing urban regions. Shaded by century-old poplars and lulled by the sounds of rustling leaves and birdsong, it is like a private wilderness—remote, secluded and tranquil.

But the beauty and solitude found along the trail and in many other parts of the 7,050-acre Duke University property belie its role as a bustling hub of research, teaching and recreation.

On any given day the forest, which marks its 75th anniversary this year, buzzes with activity as an outdoor classroom for hundreds of Nicholas School and Duke students, a nationally known research laboratory for environmental sciences, a productive timberland, a nature preserve and historic site and a favorite destination for K–12 field trips. The woodlands, wetlands, streams and meadows found within its six geographic divisions in Durham, Orange and Alamance counties are a mecca for hikers, joggers, bicyclists, horseback riders and other outdoor enthusiasts.

“As one of the nation’s largest private research forests, Duke Forest is a unique resource not only for the Nicholas School but for the entire Duke and Durham communities,” says Judson Edeburn, who has served as forest manager since 1978.

“Because the land is conserved but not locked up, it provides a wide range of educational, recreational and environmental services today that weren’t foreseen by the forest’s founders,” he says. “It literally and figuratively has grown in ways they couldn’t have imagined.”
A VISION TAKES ROOT
Duke Forest originated in the mid-1920s when Duke’s administration began purchasing small farms and woodland tracts in surrounding counties as a buffer for the new campus and as space for future expansion. These lands officially became Duke Forest in 1931, when they were placed under intensive management as experimental timberlands and research plots by founding director Clarence F. Korstian, who later became the first dean of Duke’s School of Forestry, formally established in 1938.

The promise of the new forest notwithstanding, it was a bleak time for southern forestry. America was in the grip of the Great Depression. Boarded-up mills and empty lumberyards dotted the landscape. The region’s timber industry—long an economic mainstay—was in decline following decades of shortsighted management practices that had left large swaths of once-productive forests eroded, exhausted and bare.

Determined to make a difference, Korstian set forth a bold vision for Duke Forest. Its farm fields and patchwork forests would be transformed into an outdoor classroom and laboratory for training a new breed of foresters and developing smarter, more scientific management practices for southeastern silviculture.

Over the next decade, miles of dirt and gravel roads were cleared and thousands of acres of abandoned fields within the forest were replanted with trees to create demonstration plots where students could learn practical and economical techniques for growing timber. It was grueling work. Payroll records from 1931 show that forest crewmembers—often impoverished graduate students themselves—earned between 25 and 60 cents an hour to perform the backbreaking labor, and frequently
“As a city and a county, we need to consider the recreational activities and amenities that Duke Forest brings to the region and what that means for us. It’s hard to put a dollar value on that. But without it, this community wouldn’t be as desirable.”
Becky Heron
Durham County Commissioner

“We were fortunate that Duke Forest was a working forest rather than a preserve or just an experimental forest or teaching laboratory. It provided a space where students, faculty and the public could see the results of forest management practices first hand. One impression it left on everybody was that you could manage a forest and have economic, recreational and environmental values retained.”
Tom Terry MF’67

“I lived in the forest for seven years while getting my MS and PhD degrees at Duke, so you could say I have an ‘insider’s perspective.’ I don’t think I would have had the same level of success in my education or career without the support I received from Duke Forest.”
John S. King MS’91, PhD’97
Assistant Professor of Tree Physiology, NC State University

“For me, Duke Forest has been many things: a buffer from civilization; a sanctuary; a classroom; and a playground. ... It sums up why I was drawn toward Duke’s graduate program to begin with. Duke truly promotes the multi-uses that many of its graduates go on to practice all over the world.”
Ryan Lafranz MEM’01

“I remember going out into the forest the day after Hurricane Fran hit to help assess the damage. ... We were supposed to count downed trees—just those that fell across the trails. We could have stopped at 200 or 300 or 500, but the number kept rising. I remember getting dizzy from climbing over so many stumps and logs.”
Andrea Bedell Loucks MEM’96

“One of the very special things about Duke Forest is the refuge it provides for stressed-out students. ... Running and walking in Duke Forest kept me sane throughout law and grad school.”
Andrea Treece MEM/JD’02

“Duke Forest and the staff who managed it … formed my most lasting connections to Duke University. The forest is truly an incredible asset to the entire Durham community.”
Mark D. Hollberg MF’82

“I took mountain biking one semester, and every Tuesday and Thursday we would pedal off into the forest to various sanctioned, and perhaps unsanctioned, trails, spending a full hour and a half getting thoroughly exhausted, muddy and sometimes bloody. ... There was something so refreshing about being able to hop on my bike and, within minutes, escape all evidence of my busy, technology-ridden, deadline-filled campus world.”
Eleanor Bates Keeler T’02

“Our class was learning about timber cruising and I was out in the forest with a partner. I reached around a large tree to take a diameter measurement, and while I was basically hugging the tree a chameleon scooted around in front of my face. Being from New York, I had never encountered a chameleon before and my ensuing scream brought not only my partner but quite a bit of ridicule from fellow classmates. ... It still brings a smile to my face and a wave of nostalgia when I recall it.”
Mona Griswold MF’77
worked 10- to 12-hour days. Research in the forest focused on issues critical to timber production, such as seedling spacing, fire management, soil chemistry and pest control.

"Much of what we now consider to be common knowledge about the silviculture of southern forests was researched and first applied at Duke Forest during these years," Edeburn says proudly. "Some of the papers published on soil-site relationships are still being cited today."

Despite the overwhelming workload—or perhaps because of it—Korstian, his students and fellow faculty members formed a tight-knit band. Long, hard days of work were enlivened with evening campfires, practical jokes and a sense of camaraderie that remains a vivid memory for surviving participants even today.

William R. "Randy" Boggess MF40 first saw Duke Forest in January 1935 when he came to Duke as a graduate teaching assistant in botany. He worked as a research assistant to Korstian in 1936 and on one of the Duke Forest work crews in the summer of 1938. (See an alumni profile of Boggess, page 34.)

"I have fond recollections of both the forest and the people," the 93-year-old retired forester from Austin, Texas, says. In spite of sore backs, blistered hands and frequent run-ins with chiggers, mosquitoes and copperheads, morale in the forest rarely flagged, he says, because of a shared belief that they were doing important work.

ADAPTING TO CHANGE
By the 1940s, Duke Forest’s research and teaching focus broadened to include the emerging field of forest ecology—a shift that reflected the scientific community’s growing understanding of the relationships between forest change, health and productivity.

Drawing on the data they had amassed from more than a decade of biological surveys and plot sampling in Duke Forest, Korstian and his colleagues published seminal studies on the process of forest change and the impacts of human disturbances on forest ecosystems.

Those studies, and the comprehensive database Korstian and his team created, "are benchmarks scientists still use today," says Norman L. Christensen Jr., professor of ecology and founding dean of the Nicholas School. "They helped form the foundation for southern forest ecology as we know it today, and established Duke Forest as a site ideally suited for long-term ecological research."

Christensen himself is one of hundreds of researchers indebted to this legacy. His studies conducted over the last 30 years, on plant succession, the impact of deer populations and the role of natural fire regimes in southeastern forests would not have been possible, he says, without having access to permanent research plots and forest archives in Duke Forest. (See the special feature on Christensen, page 2.)

"Nearly all research on southern forest ecology from the 1950s onward has roots that trace back, directly or indirectly, to Duke Forest," he says.

Edeburn agrees. "One of the things that makes the forest so valuable for scientists is that it has remained a research and teaching facility throughout its history, even as surrounding lands have been developed," he says. "We have detailed records that document every tree that has been planted here, and every research and forest management activity that has taken place here, for the past 75 years. That’s an incredible resource."

Since the 1990s, the forest’s focus has expanded yet again to encompass disciplines in the natural and environmental sciences—a change that mirrors the School of Forestry’s evolution into the Nicholas School of the Environment and Earth Sciences.

This year, at sites throughout the forest, students and scientists from Duke and other universities are conducting more than 50 research projects on subjects as diverse as water quality, air quality, botany, zoology, wetlands restoration, soil science, carbon sequestration and climate change. The U.S. Department of Energy, NASA, the National Science Foundation and the USDA Forest Service are among the agencies that sponsor this research, valued at $4 million.

One measure of Duke Forest’s status as one of the nation’s leading venues for environmental research, Edeburn says, is that studies on carbon sequestration and climate change conducted at the forest’s Free-Air CO2 Enrichment (FACE) site have yielded more than 200 peer-reviewed scientific papers.

"That’s an astounding number," he says. "It rivals any site in the world."

Teaching remains an equally vital part of the forest’s function. More than 475 master’s projects by Nicholas School and Duke students have been based on research in the forest. Hundreds of classes and field exercises are held there annually. Each year, the facility hosts more than 13,000 visits by students from grade school to graduate school. Some of these visits have left indelible impressions—on students and instructors alike.

"Some of my favorite memories of Duke Forest are from trips I led for a volunteer group called WOODS — Wilderness Outdoor Opportunities for Durham Students," recalls Duke alumna Lauren Stulgis T’01.

The children served by WOODS "were mostly minority, mostly low-income, from homes in the poorer neighborhoods of Durham, and virtually none of them had any outdoor experience," Stulgis explains. "We did different trails (in Duke Forest) with the kids, and, in..."
Want to learn more about Duke Forest? A new book, *Duke Forest: A Tribute* ($21.95) tells its story in rich detail, from its early days as a patchwork of abandoned farms and woodlands through its role today as one of America’s most important outdoor classrooms and laboratories for environmental research.

The 150-page book was published this fall as part of yearlong celebrations marking the forest’s 75th anniversary. Proceeds from its sale will support educational activities and facilities upkeep in the forest—helping ensure that it remains a vital hub of research, teaching and recreation for years to come, says forest manager Judson Edeburn.

The book features historic and current photographs and maps of Duke Forest; an overview of its history and development; stories about the people who have managed and used it over the years; recaps of some of the most significant research findings made there; and a wealth of little-known facts about the unique geographic features, biological communities and historic sites the forest contains.

To order a copy or for more information, contact the Office of the Duke Forest at dukeforest@duke.edu or call (919) 613-8013.

_A Local Landmark_

While research and teaching remain Duke Forest’s core academic missions, conserving the natural features found within the forest—and making them accessible for the enjoyment and education of the local community—also is a high priority.

In 2004, the university signed an agreement with the North Carolina Department of Environment and Natural Resources to place 1,220 acres of the forest in the Registry of Natural Heritage Areas. The voluntary, nonbinding agreement signaled the university’s intent to preserve these lands—the forest’s most significant natural areas—for the enjoyment, education and benefit of future generations.

Placing areas like Bald Mountain, Stony Creek Springs, the rhododendron bluffs along New Hope Creek and the forest’s rare Piedmont meadow flats on the registry “underscored their importance not only for the biological diversity and scenic beauty they contain but also for the long-term research opportunities they provide,” Edeburn says.

“The agreement gave formal recognition to something we’d been doing informally for years. Environmental stewardship has always been a core value here. It helps ensure our ability to meet the forest’s mission for years to come.”

With more than 11 miles of hiking trails and 76 miles of forest roads for visitors to explore, and with dozens of historic sites—including remnants of cobblestone Colonial roads, plantations, pioneer cemeteries and Native American encampments—dotting its landscape, Duke Forest attracts more than 170,000 recreational visits a year.

Accommodating these visitors presents Edeburn and his four-person management staff with the tricky task of providing for public amenities and safety, while making sure that recreational activities don’t conflict with the teaching and research projects going on in the forest. But it also presents new opportunities. Having 170,000 chances a year to teach visitors about the importance of environmental stewardship and the vital ecological services Duke Forest provides to its human neighbors is an educator’s dream, Edeburn says.

“Seeing the light bulb go on when people begin to understand the impact their day-to-day activities can have on the environment—or when they start to realize the role the forest plays in providing essential services like clean air and water—that’s the icing on the cake,” he says grinning. “You know they’re starting to see the human-forest interface in a whole new light.”

Tim Lucas is the Nicholas School’s national media relations and marketing specialist.
Sometime in October the population of the United States topped 300 million and the Earth seems destined to harbor at least 9 billion humans by the middle of this century. Population growth is a phenomenon that no one wants to discuss, but it underlies nearly every environmental issue we face. At the first Earth Day, one campus slogan was, “whatever your cause, it’s a lost cause unless we control population.” Those words are as true today as they were in 1970.

The high number of young people alive today creates what is known as demographic momentum—making it inevitable that the world’s population will continue to grow substantially in the coming decades. It is easy to develop a notion of inevitability about the problem of human population growth. We should not. The newest predictions of future population are lower than they were a few years ago, when the United Nations anticipated 12 billion global citizens for 2050. Funding for family planning, education, and economic empowerment have made a difference, and further progress is possible. One can envision the benefits of a world in which every child is a wanted child; any reduction in births would reduce future resource demand upon our planet.

Daily, I hear descriptions of environmental degradation in North Carolina, including urban sprawl, traffic congestion, and air pollution. All these problems, and rising carbon dioxide from fossil energy, are exacerbated by rising numbers of people, each demanding his or her portion of the global resource pie. Our politicians should realize that an emphasis on growth is shortsighted; it offers economic benefits today at the cost of a sustainable environment and economy for tomorrow.

In the United States about half of the population growth is driven by immigration from outside our borders. The rate of population growth in the United States rivals that of many third-world countries. Do we close the borders of our country and preserve our lifestyle, or do we continue to absorb the overflow of rapid population growth elsewhere in the world? Given the immigrant heritage of nearly all U.S. citizens, this is a tough question. Several have made the analogy to the early passengers in a lifeboat, who face the choice of pulling in more passengers to join them, perhaps swamping the boat, or choosing harshly to pass by those who flounder in the water.

Global environmental issues make this analogy too simple, for we are all in the same boat. Climate changes wrought by actions of the industrialized world are likely to have a disproportional impact on the developing world, leading to a greater immigration pressure. Over-exploitation of the world’s oceans leaves all the world’s people impoverished, and rising demand for petroleum is played out on a global market over which we have little control. Indeed, only economic empowerment of the developing world will relieve the desire of many to immigrate and speed progress towards stabilizing lower birth rates in those regions.

The question we should ask is not whether we should allow high immigration rates to the United States, but whether we can foster conditions around the world that offer a better life and a better environment for all of Earth’s people. That is, of course, the mission of the Nicholas School, where we know that population growth touches every issue we address.

William H. Schlesinger is dean of the Nicholas School and James B. Duke Professor of Biogeochemistry.
The Spinetail and the Antbird

Mariana Vale Studies Birds to Understand Deforestation in the Amazon

by Michael Tennesen

Whoever said the road to paradise leads first through the gates of Hell must have ridden the overnight bus from Ciudad Guyana, Venezuela, to Boa Vista, Brazil.

The only road between the two cities is a narrow strip of crumbling pavement. Marked by steep inclines, hairpin curves and terrifying descents, it zigzags up the stark, windblown peaks of the Guiana Highlands before plunging into the vast green expanse of the Amazon Basin. My bus driver, however, thinks he’s on a six-lane expressway. He barrels down the road at a madman’s pace. Around midnight, two headlights round a blind corner in front of us and swerve into our lane. The vehicles veer to the sides at the last minute and pass within inches of each other. An overhanging branch smacks against our bus and cracks a window. My driver slows only briefly.

I am making the trek to Boa Vista, the remote capital of the northern Brazilian state of Roraima, to meet Mariana Vale, a Nicholas School doctoral student in the University Program in Ecology.

Vale, a native Brazilian, studies the effect of deforestation on the region’s wildlife, particularly on two species of birds found nowhere else in the world: the hoary-throated spinetail and the Rio Branco antbird. She began her study of the birds several years ago as a way of assessing the damage that Avança Brasil, a multi-billion-dollar development program launched in 2000, might be having on biodiversity in this frontier state. The program is bringing roads, dams, and other infrastructure to the region, literally paving the way for its development. But it’s also bringing conflict between indigenous people, who rely on the jungle for food and shelter, and newly arrived farmers and ranchers who want to clear it for fields and pastures.

Vale is a member of Stuart L. Pimm’s lab at the Nicholas School. Pimm, Doris Duke Professor of Conservation Ecology, selected her for the project because of her past experience studying deforestation issues in the region and because, as a native Brazilian, she’s readily accepted by the local community. It doesn’t hurt that she has a big, friendly smile that helps get her through tight spots.

The morning after I arrive in Boa Vista, however, Vale’s smile has been replaced by a frown. After a frenzied race through town to gather supplies and gear needed for an expedition up the Rio Branco—a tributary of the Rio Negro—we are waiting in a small café for Claudio, our boat driver, who is late. Vale is worried. “Claudio is never late,” she says.

An hour later, Claudio shows up in an open, 18-foot aluminum rental boat with a meager 15-horse power motor. The wiry young Brazilian tells us that last night, heavy rains filled up his own boat and it sank in the river near his home. He will get the local fire department to come help him fish it out but he had to rent another boat for now. Vale is concerned that the added expense will cut into her funds for the expedition.

We get in the boat, Claudio throttles the motor on high, and we head up the river under a scorching equatorial sun. The tropical forest that flanks the rivers is lush with foliage and dotted with brightly colored fruit and flowers. The array of plant species on display is staggering.

The gallery forest, as this riverside greenery is called, is home to the hoary-throated spinetail and the Rio Branco antbird, Vale says. Both of the small but significant birds are listed on the World Conservation Union (IUCN) Red List as vulnerable.

While working on her master’s thesis at Columbia University, Vale used a computer model to determine which of the Amazon’s bird species would be most affected by deforestation and development. The model identified the antbird and the spinetail. But when Vale looked at the literature on the birds’ home ranges, she realized many of the boundaries had been described by as few as five sightings and couldn’t be trusted. “I knew I had to get on the ground and see for myself,” she says.

Both birds are found principally on indigenous reserves—areas set aside by the government for native peoples. These people have lived in the Amazon for more than 10,000 years and have learned to coexist with its other species, Vale says. It is the newer, more impatient arrivals who seem to do the most damage to the birds’ habitat.

In the 1970s, Brazil opened BR174, a new highway, into the state of Roraima. The road was paved in 1997. Indigenous people suffered some of the worst effects of the assault that followed. The road began in Manaus, a city at the junction of the Rio Negro and the Amazon River, and headed north through the land of the Waimiri-Atroari people.

Deaths through conflict and diseases that spread following the opening of the road reduced the Waimiri-Atroari population from...
about 1,500 to less than 300. Farther north, in the forests around Boa Vista, farmers, ranchers, and gold miners pushed deep into native lands, leaving a trail of environmental degradation in their wake, Vale says.

On April 15, 2005, however, Brazil’s president, Luís Inácio Lula da Silva, ratified a bill that created the Indigenous Territory Raposa Serra do Sol. The reserve gives more than 14,000 indigenous people from several different groups control over 1,747,464 hectares of land, which all non-native people must leave. Rice farmers have vowed to fight the decree to the death.

When Vale first contacted the Indigenous Council of Roraima about her interest in studying the antbird and spinetail, the reaction of its members was indifference. “They said, what do we care about little birds, we have more important things to do? But when they realized that rice farms were the enemy of the birds and the indigenous people, they grew more interested,” Vale relates.

As we head up river, we pass indigenous people in dugouts. For almost every native we see, however, we also spot the signs of modern agriculture—huge pipes and large pumps that carry water to flooded rice paddies just beyond the river’s edge. Most of these farms are trespassing on indigenous property. According to Vale, “They get away with it because the rice farmers are often businessmen, mayors and state politicians.”

On our trip we spot osprey, little blue herons, wood storks, capped herons, toucans, snowy egrets, Amazon kingfishers, and red and green Macaws. A group of gray dolphins breaks the surface and watches us speed by.

The day’s journey takes us all the way to the Guiana border. We camp for the night, tying hammocks to trees in a clearing by the river, wrapping the hammocks in mosquito nets and covering them with black plastic to protect us from the rain. Mariana shows me the large footprints of a capybara, the largest rodent in the world, in the mud along the bank. That night the screams from a group of howler monkeys awaken us around midnight.

Over the next several days, we hunt for the spinetail and the antbird, testing the limits of their boundaries. We move up the Máu River, stopping every three kilometers to play recordings of the birds’ territorial calls into the gallery forest, but no birds answer the challenge.

The next day we head up the Parimé River, an area where neither the antbird nor the spinetail previously has been reported. Mariana continues to play the calls. Finally a little after noon, one of the calls is returned. Mariana and Claudio follow the sound into the thick vines by the river. Suddenly Mariana points at the bush, “There it is. Do you see it?”

The bird comes out and shows itself. It is a beautiful bird, with a rust colored body, a black throat, light blue beard, and mottled crown. This is the first sighting of this bird on this river.

A few days later we are back in Boa Vista, sunburned and mosquito bitten. We drive out to boat driver Claudio’s home, a four-room adobe house with no plumbing or electricity but a million-dollar view of the river. Vale introduces me to Claudiomino, one of Claudio’s two sons, a 12-year-old boy who leads me through the streamside trees playing Vale’s birdcall recording.

Another hoary-throated spinetail answers the call. It perches near us and challenges the recorded intruder with an aggressive yet regal air. Claudiomino smiles proudly. Getting native Brazilians to appreciate moments like these is an important part of Vale’s challenge.

Even as her work to test the boundaries of the birds’ ranges winds down, Vale is already talking about her next challenge: To examine the deforestation along BR174 and document its effects on the Amazon Basin. The basin covers 7 percent of the earth’s surface and contains 40 percent of its tropical forests. Yet it’s being cleared at the rate of about 10 to 30 thousand square kilometers a year.

The situation is dire, says Vale’s advisor, Stuart Pimm. “This figure represents only the land that has been cleared, what you can see from space. When you add in what’s been damaged by fire, illegal logging, and oil and gas development, the damage could be as high as 100 thousand square kilometers a year. With about 3 to 4 million square kilometers left, in 30 to 40 years, it’s all going to be damaged,” he says.

But there are some positive signs. Recently the Waimiri-Atroari people celebrated the birth of their 1000th citizen—back from a low of 300. Says Vale, “Twenty years ago biodiversity and sustainability weren’t even part of the vocabulary. Now a lot of people are working hard for them. Eighty percent of the Amazon forest still stands. It is not a lost cause.”

Freelancer Michael Tennesen of California was a Nicholas Environmental Media Fellow.
The sun has already burned away most of the morning mist as Dalia Amor-Conde boards a boat in the ancient island city of Flores in northeastern Guatemala and heads out across the dark waters of Lake Peten Itza. Unlike most visitors to Flores, Amor-Conde’s destination today isn’t the towering Mayan ruins of nearby Tikal. Instead, her boat speeds in a different direction toward a distant, low-lying speck of land—a tiny, forest-shrouded island that is home to the Asociacion de Rescate y Conservacion de Vida Silvestre (ARCAS) and its world-renowned Peten Rescue Center.

Since 1989, hundreds of rare and endangered tropical animals have been confiscated from illegal traffickers in the Mayan Biosphere Reserve or rescued from humans who ill-advisedly tried to raise them as pets, and rehabilitated at the center.

Amor-Conde, a doctoral student in the University Program in Ecology at the Nicholas School, is a member of an interdisciplinary research team that studies jaguars. Fernando Martinez, the director of ARCAS who also is lead veterinarian for jaguar captures, greets her as her boat arrives at the island’s floating dock. He leads her through the facility, past parrots, toucans, scarlet macaws and monkeys, to the back of the station where he’s housing a new arrival: A jaguar raised by humans that is too tame to return to the wild.

Mosquitoes buzz around Amor-Conde’s eyes and sweat drips from her forehead. But neither the bugs nor the heat can diminish the thrill of her first sight of the animal as it pads back and forth, its muscles rippling behind a chain link fence. For a moment jaguar and humans stare into each other’s eyes.

“Looking into the eyes of a jaguar is a transforming experience,” Amor-Conde says. “It engages you. You feel like you cannot let this species and its jungle disappear.”

Historically the jaguar has been one of Central America’s most important predators, but today the magnificent cat is a threatened species. The Mayan Forest, a vast swath of tropical wilderness that includes national parks and protected areas in adjoining regions of Mexico, Belize, and Guatemala, provides its most important habitat.

Amor-Conde’s research focuses on the ability of the jaguar to travel between the protected areas within the forest. Central America, she says, is home to 7 percent of the world’s species and is one of the most biologically diverse regions on the planet. However only 20 percent of its forest remains.

Her work is part of an international research and conservation effort intended to reverse that trend and to maintain the Mesoamerican Biological Corridor, which was designed to allow the jaguar to travel from Panama to Mexico.

Amor-Conde’s PhD thesis, which she is completing under the supervision of faculty advisor Norman L. Christensen Jr. (see a profile of special feature about Christensen on page 2), addresses the conflict between jaguar habitat and roads and other human development in the region.

In it, she is evaluating the proposed linkage of the National Parks in the Mayan Forest, using the movement of jaguars between them to determine the success of the corridors between them—not merely for jaguars themselves, but for a whole Noah’s Ark of other species who inhabit the forests.

“The jaguar is the top predator,” Amor-Conde explains. “If you conserve it, you also conserve all the other species that are further down the food chain. Plus you conserve the tropical forest, which is important not only to local species but North American migratory birds.”

Over past years, Amor-Conde and her husband, Fernando Colchero, have worked with a number of institutions in Mexico on jaguar conservation. These groups include the highly respected Institute of Ecology at the National University of Mexico; Unidos Para la Conservacion; Sierra Madre Alliance; and Ecosafis.

Colcheros, also a PhD student at the Nicholas School, has since switched the focus on his work to diverse projects, including the effects of climate change on sooty terns in the Dry Tortugas west of the Florida Keys. But Amor-Conde has remained focused on the plight of the jaguars.

She has participated in more than 10 captures of wild jaguars and describes those captures as “amazing experiences.”

On a recent capture, she joined a team of biologists, trackers and their dogs, and a veterinarian in Mexico’s Calakmul National Park. Tony Rivera, a former jaguar hunter turned conservationist, led the expedition. Rivera leads all jaguar capture expeditions for the project. He checked a jaguar bait station along a dirt road and announced to Amor-Conde and the others that a cat had taken the bait, and that the frenzy of the dogs in the back of the truck told him
Amor-Conde and her colleagues were able to assess the animal's health and track its movements. The dogs pulled back, Rivera raised his rifle, took aim, and fired a tranquilizer dart into the animal's side. The drug soon took effect, and Amor-Conde and her fellow scientists quickly picked up the animal. The team working with the jaguar had a hard time keeping up as the animal ran through the forest in a hurry.

“Despite our best efforts, we were not able to follow the cat on its own,” says Amor-Conde. “We use collar technology to track jaguars which can put them at odds with local ranchers who could follow its future movements.”

Amor-Conde says that Rivera’s work has proved invaluable to her project. “In all the years he’s been capturing jaguars, we’ve never lost an animal.”

Recently she has turned her interest to jaguar conservation in Guatemala, where small but dedicated NGOs like ARCAS and Defensores de la Natureza have been spearheading a growing awareness and passion for the environment in that country. Part of their efforts has been educating local residents about jaguar behavior and biology.

Jaguars, Amor-Conde says, prey on a number of medium-sized animals in the Mayan Forest including the white-tailed deer, the red brocket deer, the collared peccary (a wild pig), the Baird’s tapir, the agouti (a large rodent), the armadillo, and the coatimundi (a relative of the raccoon). The cats follow paths in the forest, mostly at night, ambushing and overpowering their prey with powerful teeth and claws.

Jaguars don’t attack people. But they do take an occasional cow, goat, or chicken, which can put them at odds with local ranchers and farmers. Amor-Conde and her colleagues at the initiative called Jaguars Without Borders have been trying to get the governments of Mexico, Belize, and Guatemala to protect the big cats’ habitat, and enact “jaguar insurance” that would pay biologists to remove the cats and re-locate them to regions where they will do less harm.

Female jaguars are reproductively active after only a year. The female may have as many as four cubs, feeding them without the male’s help until the cubs are ready to hunt on their own. Jaguars can live up to 30 years in captivity, but may live only half that amount in the wild.

Though Amor-Conde and her colleague’s studies have been limited due to prohibitive costs (each capture and collaring of a jaguar costs between $4,000 and $7,000), the group has retrieved enough data to get a good idea of the type of forest habitat jaguars frequent.

On a recent cloudy day during the rainy season in Guatemala, Amor-Conde accompanied Lucrecia Masaya, research and conservation director at Defensores de la Naturaleza, on a jaguar tracking mission into the Peten region’s dense Laguna del Tigre National Park.

According to Masaya, her group is interested in a number of environmental causes, and “the healthy populations of jaguars are one way to tell of if the things we are doing are working or not.”

The dirt road the women follow is only two years old, yet cattle ranches and some slash-and-burn agriculture have already destroyed wide swaths of tropical forest along it. The road leads them to the Rio San Pedro, where they take a boat upriver into the Las Guacamayas Biological Station, a wonderful, underutilized facility on the river with showerers, a kitchen, and high-roofed cabins covered with palm fronds.

At dusk Amor-Conde and Masaya climb a tower on a nearby knoll, gaze at the surrounding rainforest, watch tropical birds fly by, and listen to the howler monkeys roar in nearby trees. They are not far from the Mexican border—and in this part of the border, the Rio San Pedro serves as a conduit for illegal immigration and drug traffic into the neighboring country.

By morning light, Amor-Conde gathers Masaya and several of the men and shows them a map of the new roads that the governments of Mexico and Guatemala have planned to build into the region, to help attract tourism and commerce from the Yucatan beaches into the inland Mayan jungles and its spectacular ruins. The plans call for a network of 12-meter-wide paved roads. “Can you imagine the impact that will have on jaguars’ habitat?” she asks. She reminds them of the deforestation and habitat loss they saw along the road into the park. “And that,” she cautions, “was along a dirt road.”

Amor-Conde’s work in the Mayan Forest is part of the Mesoamerican Biological Corridor Initiative that will allow jaguars and other animals to migrate all the way from Panama to southern Mexico. The idea has support from Central American nations and the World Bank and other agencies have committed $400 million. But Amor-Conde points to a program initially called the Plan Puebla Panama in which the Inter-American Development Bank, World Bank, and other agencies have budgeted more than $5 billion for the construction of over 332 dams and 10,900 kilometers of roads that could negate the efforts behind the Biological Corridor.

Amor-Conde admits that people in the Mayan Forest are desperate for land, but thinks there are better alternatives to cattle ranching and nonsustainable agricultural practices in the rainforest.

“The future of this animal depends not on the biologists, but on the people, on the local communities,” she says. “Only if they get involved in conservation will the jaguar survive.”

Freelancer Michael Tennesen of California was a Nicholas Environmental Media Fellow.
In Print
Recent publications by Nicholas School faculty or staff

Richard M. Anderson, assistant professor

Emily S. Bernhardt, assistant professor
- “Long-term Effects of Free Air CO2 Enrichment (FACE) on Soil Respiration,” Biogeochemistry, 2006 (lead author w/ J. Pippen and W. Schlesinger et al.)

Norman L. Christensen Jr., professor of ecology

James S. Clark, H.L. Blomquist Professor of Biology
- Hierarchical Modeling for the Environmental Sciences: Statistical Methods and Applications, Oxford University Press, June 2006 (ed. w/ A. Gelfand)

Bruce H. Corliss, professor of earth and ocean sciences

Michael S. Coyne, research scientist
- “Phenotypically Linked Dichotomy in Sea Turtle Foraging Requires Multiple Conservation Approaches,” Current Biology, 2006 (coauthor)

Larry B. Crowder, Stephen Toth Professor of Marine Biology
- “Resolving Mismatches in U.S. Ocean Governance,” Science, August 2006 (lead author)

Richard T. DiGiallo, professor of environmental toxicology
- “The Role of the Aryl Hydrocarbon Receptor Pathway in Mediating Synergetic Developmental Toxicity of Polycyclic Aromatic Hydrocarbons to Zebrafish,” Toxicological Sciences, 2006 (coauthor w/ A.R. Timme-Laragy, D. Wassenberg PhD ’04 et al.)
- “Lack of p53 Induction in Fish Cells by Model Chemotherapeutics,” Oncogene, 2006 (coauthor w/ M. Rau Embry PhD ’04 et al.)
- “Developmental and Behavioral Effects of Embryonic Exposure to DE-71 in Fundulus Heteroclitus,” Chemosphere, 2006 (coauthor w/ A. Timme-Laragy)
- “The Chlorinated AHR Ligand 3,3’,4,4’,5-pentachlorobiphenyl (PCB126) Promotes Reactive Oxygen Species (ROS) Production During Embryonic Development in the Killifish (Fundulus heteroclitus),” Aquatic Toxicology, 2006 (coauthor w/ D. Wassenberg PhD ’04 et al.)

Patrick N. Halpin, Gabel Associate Professor of the Practice of Marine Geospatial Ecology

Gabrielle C. Hegerl, associate research professor
- “Climate Sensitivity Constrained by Temperature Reconstructions over the Past Seven Centuries,” Nature, April 2006 (lead author w/ T. Crowley, W. Hyde et al.)

David E. Hinton, Nicholas Professor of Environmental Quality
- “Functional Characterization of Medaka CYP3A38 and CYP3A40 by Expression in a Recombinant Baculovirus System,” Comparative Biochemistry and Physiology, 2006 (coauthor w/ S. Kullman et al.)

K. David Hyrenbach, research scientist
- “Techniques for Cetacean-habitat Modeling,” Marine Ecology Progress Series, 2006 (coauthor w/ P. Halpin, S. Qian, A. Read et al.)

Robert B. Jackson, professor of environmental sciences and biology

Gabriel Katul, professor of hydrology and micrometeorology
- “Modeling Nighttime Ecosystem Respiration from Measured CO2 Concentration and Air Temperature Profiles using Inverse Methods,” Journal of Geophysical Research, Spring 2006 (coauthor w/ M. Siqueira PhD’02, S. Palmroth, R. Oren et al.)
- “Buoyancy and the Sensible Heat Flux Budget Within Dense Canopies,” Boundary-Layer Meteorology, Spring 2006 (coauthor w/ D. Poggi et al.)
Randall A. Kramer, professor of resource and environmental economics

Seth Kullman, assistant research professor
- "Removal and Bio-analytical Analysis of Endocrine Disrupting Compounds in Water with UV and UV/H2O2 Processes," Chemosphere, 2006 (coauthor w/ P. Chen PhD ’05 et al.)

Peter E. Malin, professor of seismology and civil and environmental engineering

Marie Lynn Miranda, associate research professor
- "Approximately Optimal Spatial Design Approaches for Environmental Health Data," Environmetrics, 2006 (coauthor w/ A. Gelfand et al.)

Ram Oren, professor of ecology

Stuart L. Pimm, Doris Duke Professor of Conservation Ecology
- "Human Impacts on the Rates of Recent, Present, and Future Bird Extinctions," Proceedings of the National Academy of Sciences, June 2006, (lead author)

Jeffrey S. Pippen, research associate
- "Annual Basal Area Increment and Growth Duration of Pinus Taeda in Response to Eight Years of Free-air Carbon Dioxide Enrichment," Global Change Biology, 2006 (coauthor)

Andrew J. Read, Rachel Carson Associate Professor of Marine Conservation Biology
- "By-catches of Marine Mammals in U.S. Fisheries and a First Estimate of Global Marine Mammal By-catch. Conservation Biology, 2006 (lead author)

Kenneth H. Reckhow, professor of water resources, and chair Division of Environmental Sciences and Policy

James F. Reynolds, professor of environmental science and biology

Curtis J. Richardson, professor of resource ecology
- "Restoring the Garden of Eden: An Ecological Assessment of the Marshes of Iraq," BioSciences, June 2006 (lead author)

Daniel D. Richter, professor of soils and forest ecology
- "Changes in Stable Isotopic Signatures of Soil Nitrogen and Carbon During 40 Years of Forest Development," Oecologia, January 2006 (coauthor)

James Salzman, professor of law and Nicholas Institute professor of environmental policy
- "The Effects of Wetland Mitigation Banking on People," National Wetlands Newsletter, March 2006 (coauthor)

William H. Schlesinger, James B. Duke Professor of Biogeochemistry
- "Biomass and Toxicity Responses of Poison Ivy (Toxicodendron radicans) to Elevated Atmospheric CO2," Proceedings of the National Academy of Sciences U.S.A., 2006 (coauthor w/ J. Mohan MEM’93, PhD’02 and J. Clark et al.)

John Terborgh, James B. Duke Research Professor
- "Habitat Fragmentation and Effects of Herbivore (Howler Monkey) Abundances on Bird Species Richness," Ecology, 2006 (coauthor)

Lisa M. Valvo, staff specialist (DEL)
Amer Vengosh, associate professor
• “Rooting out Radioactive Groundwater,” Geotimes, May 2006 (author)

Erika Weinthal, associate professor of environmental policy

Memberships, Appointments, and Awards

James S. Clark, H.L. Blomquist Professor of Biology, served again as director of the 2nd Institute on Statistical Computation for Ecological Inference and Prediction this past summer. The Summer Institute is an NSF-funded 11-day graduate/post-graduate level summer school that introduces ecologists and earth scientists to modern statistical computation techniques. The institute convened in June at the Center on Global Change on the Duke campus. Clark also served on the NSF review panel in for UCLA’s Center for Embedded Network Sensing (CENS). The center is a major research enterprise engaged in the development of wireless sensor systems and the application of revolutionary sensing technology to critical scientific and societal applications.

Dale Gillette, adjunct professor in the Division of Earth and Ocean Sciences, received the Distinguished Career award at the 6th International Conference on Aeolian Research (ICAR) for his “outstanding theoretical and empirical contributions to the study of sediment transport by wind.” The award was presented at the ICAR conference in July at the University of Guelph, Ontario, Canada.

Gabel Associate Professor of the Practice of Geospatial Marine Ecology Patrick N. Halpin has been selected to serve on two committees, the U.S. National Committee for The Census of Marine Life (CoML), and the Steering Committee for the World Conservation Basemap initiative.

The U.S. National Committee builds partnerships among federal and state government agencies, marine industries, environmental groups, universities and marine labs, aquariums and natural history museums, in order to identify U.S. research and data priorities, encourage programs and develop funding, provide quality control, and promote knowledge of the CoML and its findings.

The World Conservation Basemap initiative, conceived in 2005, is a consortium of regional and global conservation organizations that is working to create a Web-based Conservation Geoportal and an online World Atlas of Conservation. Professor of hydrology and micrometeorology and a fellow of the American Geophysical Union (AGU), Gabriel Katul assumes the office of secretary for the Hydrology Section this fall. AGU is a worldwide scientific community that advances, through unselfish cooperation in research, the understanding of Earth and space for the benefit of humanity.

The Society for Marine Mammalogy has elected Rachel Carson Associate Professor of Marine Conservation Biology Andrew J. Read as president beginning August 2008. Election as SMM’s president represents a four-year commitment, beginning with two years as president-elect followed by two as president. The society is the world’s leading scientific society devoted to the educational and scientific advancement of marine mammal science and the conservation of marine mammal populations.

Dean of the Nicholas School and James B. Duke Professor of Biogeochemistry William H. Schlesinger is a new member of the Board of Trustees for the Southern Environmental Law Center (SELC). SELC is headquartered in Charlottesville, Va., and has offices in Chapel Hill, N.C., and Atlanta, Ga.

Research assistant Michael S. Coyne began his term as president of the International Sea Turtle Society in May 2006. The ISTS is a global network of diverse peoples, professions and cultures sharing knowledge, ideas and inspiration to ensure healthy sea turtle populations worldwide by promoting the exchange of information that advances the global knowledge of sea turtle biology and conservation. Election as president is a five-year commitment of which two are served prior as president-elect and two following as past president. During his presidency Coyne will be responsible for organizing and hosting the next Annual Sea Turtle Symposium, which will be held in February 2007 in Myrtle Beach, S.C.

Grants
Grants of $50,000 or more awarded to faculty in the past six months

Paul A. Baker, professor of geochemistry, National Aeronautics and Space Administration, $225,296, “The Influence of the Amazon and Orinoco Plumes on the Tropical Atlantic Climate.”

Bruce H. Corliss, professor of earth and ocean sciences, National Science Foundation, $223,500, technical support: R/V Cape Hatteras; Office of Naval Research, $448,721, Navy Ship Time on R/V Cape Hatteras, CY 2006; Office of Naval Research, $55,500, ship support on R/V Cape Hatteras CY 2004.

Michael S. Coyne, research scientist, University of New Hampshire Large Pelagic Research Program, $ 460,990, “Spatial Ecology of Marine Turtles in the Eastern Atlantic.”
Larry B. Crowder, Stephen Toth Professor of Marine Biology, Oak Foundation, $100,000, mini grants in marine conservation.


Jonathan L. Goodall, assistant professor of the practice of geospatial analysis, Microsoft Research, $50,000, "Incorporating Hydrologic Time Series Data into Geographic Information System Software Using a Smart-client Architecture."

Patrick N. Halpin, Gabel Associate Professor of the Practice of Geospatial Analysis, Department of the Navy, $256,000, "Continued Development of the SEAMAP Data Archive"; National Science Foundation, $201,105, "Habitat Utilization and Predator-Prey Interactions in Western Antarctic Peninsula."

Robert B. Jackson, professor of environmental sciences and biology, Department of Energy, $999,786, "A Proposed Southeastern Regional Center of the National Institute of Climate Change Research at Duke University."

Randall A. Kramer, professor of resource and environmental economics, Duke University, Provost’s Common Fund, $50,000, "Frameworks for Complex Environmental Health Decision Making."

Seth Kullman, assistant research professor and co-PI with Karl Linden, civil and environmental engineering, U.S. Environmental Protection Agency, $97,402, "Presence, Fate, and Treatability of Estrogenic and Androgenic Contaminants in Wastewater and Biosolids."

Marie Lynn Miranda, associate research professor, Wallace Genetic Foundation, $65,000, "A Pilot Project on Lead and Genetics."

A. Brad Murray, associate professor of geomorphology and coastal processes, National Science Foundation, $120,685, "Productivity, Stability, and Geomorphologic Evolution of New England Salt Marshes: Plum Island Case Study"; National Science Foundation, $152,779, Collaborative Research: "Observation and Modeling of Inner Shelf Sediment Dynamics and Large-Scale Sorting: Cross-shelf or Along Shelf Transport?"


Andrew J. Read, Rachel Carson Associate Professor of Marine Conservation Biology, N.C. Sea Grant, $126,892, "Documenting Interactions Between Pilot Whales and the Pelagic Long Line Fishery"; Department of Navy, $163,500, "Investigation of the Impact of Sonar Transmission on Fisheries and Habitat in the U.S. Navy’s USWTR," (co-PI P. Halpin); Department of Defense, $428,293, "Predictive Spatial Analysis of Marine Mammal Habitats."

Daniel D. Richter, professor of soils and forest ecology, National Science Foundation, $50,000, "Collaborative Geoinformatics Research: Building a Cyber Infrastructure for Critical Zone Exploration Network."

Daniel Vengosh, associate professor, USDA, $570,000, "An Integrative Investigation of the Sources and Effects of Groundwater Contamination for Local Communities and Homeowners in North Carolina," with L. Bennear, E. Klein, E. Weinhthal, M. Miranda, and M. Wiesner (Pratt School).

—Compiled by Donna Sell, Nicholas School communications assistant
by Lisa M. Dellwo

William R. “Randy” Boggess MF’40 and Paul Trianosky MEM’93 followed a similar path to a master’s degree at Duke: after receiving undergraduate degrees, they each embarked on a career but found themselves wanting to make a professional shift.

Boggess had spent two years as a high school science teacher in West Virginia before deciding that teaching was “not for me.” Having attended summer field botany classes taught by Duke faculty at Lake Junalaska in western North Carolina, he enrolled as a graduate student in the renowned botany program and then found his calling in the new School of Forestry.

Trianosky arrived at Duke after experiencing a catharsis. Having worked for six years as a field forester for the Virginia Department of Forestry, he came to Duke to change his career direction. The year he arrived, the School of Forestry and Environmental Studies had merged with the Marine Lab to form the Duke School of the Environment.

Two foresters. Two eras. Two sterling alumni whose combined career trajectories echo larger changes in the fields of forestry and forest conservation.

**Randy Boggess**

**One of the first forestry graduate students**

Boggess had studied with Duke botany luminaries Hugo Blomquist and Henry Oosting during his summer field courses in 1933 and 1934, and therefore had earned 12 hours of botany graduate credit before arriving at Duke in the spring of 1935. In addition to his botany coursework with these professors and Paul Kramer, he took soils and dendrology classes and found himself pulled in the direction of forestry.

Like any graduate student, he was chronically short on funds. His graduate teaching assistantship yielded $60 every two months, so finding extra work was essential. “I worked for whoever had the money,” he recalls. In the summer of 1936, that was Duke Forest Director Clarence Korstian, who would become founding dean of the School of Forestry the following year.

Like any graduate student, he was chronically short on funds. His graduate teaching assistantship yielded $60 every two months, so finding extra work was essential. “I worked for whoever had the money,” he recalls. In the summer of 1936, that was Duke Forest Director Clarence Korstian, who would become founding dean of the School of Forestry the following year.

Boggess collected and analyzed leaf samples for the going wage of 30 cents per hour. Later, while waiting to join the first class of the new School of Forestry in 1938, he did a variety of other jobs in the Forest, digging soil pits, performing soil analyses, measuring sample plots, and anything else that needed doing.

Duke University was the second American college to offer a graduate forestry degree, according to Kenneth Knoerr, professor emeritus of environmental meteorology and hydrology in the Nicholas School. Professional foresters were increasingly in demand in the USDA Forest Service and similar state agencies. Boggess remembers that most of his classmates followed that path; it wasn’t until a few years later that the large paper companies began employing significant numbers of professional foresters.

Like most of the early graduates of the School of Forestry, Boggess took the Junior Foresters Exam, a difficult national certification test that was essential for working in the Forest Service, but he went to work as a research forester for the Alabama Agricultural Experiment Station, a part of Alabama Polytechnic Institute, now Auburn University.

After eight years in Alabama—interrupted by a tour as a Navy ensign and lieutenant with the U.S. North Pacific forces—he moved on to a position with the University of Illinois’ Dixon Springs Agricultural Research Station. He was in charge of the university’s forest research in the
southern third of the state, and he built a reputation by conducting research on the effect of environmental factors, especially soil moisture, on tree growth and on precipitation-runoff relationships on forested watersheds.

Paul Trianosky
A new emphasis on conservation
When Paul Trianosky was studying forestry as an undergraduate at Virginia Tech in the 1980s, his career options were more varied, but he, too, was drawn to a government agency. After working with the USDA Forest Service as part of a co-op program in which he attended classes half-time, he found postgraduate employment as a field forester for the Virginia Department of Forestry.

"Like a lot of young foresters, I wanted to work in the woods," says Trianosky, whose pursuit of an undergraduate forestry degree was built on his love of science and his passion for being outdoors. For six years after graduation, he got to do exactly what he’d dreamed of—working in the woods—and he was good at his job.

"When you’re doing all right," Trianosky says, "you begin thinking about the bigger picture and what’s next." For some people, that would mean looking to the next rung on the career ladder. But Trianosky was aware of a growing conflict between his personal convictions and his professional obligations. Called on to advise a private landowner what to do with a patch of old-growth swampland near Emporia, Va., he recalls that as a forester, his professional recommendation to the landowner would be to cut it down in order to put the land to more lucrative use. But deep down, he felt that such rare habitat should be preserved.

Trianosky set his sights on a job with The Nature Conservancy or a similar organization, but he knew his traditional forestry background wasn’t going to be the ticket to that sort of position. He consulted colleagues and professors from Virginia Tech, and he kept hearing about Duke, where the School of Forestry was offering something called a Master of Environmental Management (MEM) degree.

He entered Duke in 1991, the year the School of the Environment was created by combining the former forestry school and the Duke Marine Laboratory, but Duke had been offering the MEM degree since the mid-1970s, when national concern about natural resources and environmental problems had led the school to expand its curriculum.

Randy Boggess
Growth and change at Illinois
During his first year at Duke, Boggess had met his future wife when he and a fellow student spied two young women sitting on the quadrangle near the hospital—behind the present Old Chemistry building. "We went over to pass the time of day, and that’s how I met my wife," he says.

Almost 20 years after they married—and four children later—Boggess and his wife decided it was time to move to town. The Dixon Springs research station was in a poor and underpopulated part of Illinois, and the nearest town was 12 miles away. Their oldest child was ready for college, and his wife thought they needed more social contacts. Although he had mixed feelings about becoming "a little fish in a big pond," he readily accepted an invitation to move to the university’s Urbana-Champaign campus and join the graduate research faculty.

Left to right: Looking across the Chilhowie Reservoir on the Little Tennessee River, Paul Trianosky can see the land has been protected by the 10,000-acre Alcoa hydropower relicensing project; Randy Boggess (at right, attending the Nicholas School’s Field Day) once drove the vintage truck shown crossing New Hope Creek in this Duke Forest historical photo.
Finding Inspiration in the Forest

In addition to being passionate about forest conservation, **Paul Trianosky** is passionate about his music. Interview any of his colleagues, and they will tell you what a great musician he is just after discussing his skills in negotiating massive conservation deals.

Trianosky plays mandolin for the Grayson Highlands Band, a traditional music group started by his father-in-law 25 years ago. His wife, Susan, plays guitar and the bass fiddle he gave her in lieu of an engagement ring, and his adopted daughter, Tina, plays clawhammer banjo. Most summer weekends, they are on the road performing at outdoor music festivals, including the famous Old Fiddlers’ Convention in Galax, Va.

In 1998, he produced the album *Wasting My Time* by the bluegrass group Southern Rail, with whom he had formerly performed. “Carolina Dream,” inspired by a walk in Duke Forest, was one of three songs Trianosky wrote for the album, including the title song.

The Grayson Highlands Band at the Blue Ridge Music Center: Susan Trianosky, guitar; Tina Trianosky, banjo; Kathleen O’Connell, fiddle; Paul Trianosky, mandolin; and Jerry Smith (Susan’s dad), bass.

Band photo by Madeline Thompson
But with the expansion, his job took him farther away from the conservation work he had envisioned. That, and his wife’s desire to move closer to her family in North Carolina’s Blue Ridge, led him in 2002 to a position managing conservation programs for TNC in Tennessee.

From that job, he was promoted to the position of director of forest conservation for TNC’s southern U.S. region, coordinating relationships with federal agencies, not-for-profit organizations, and the forest industry, and helping to manage large-scale conservation projects and research in the region. He takes pride in having helped to broker a deal in which 10,000 acres of undeveloped Alcoa land in North Carolina and Tennessee would be preserved in exchange for the relicensing of four of the company’s hydroelectric facilities. It’s the kind of work he dreamed about when he decided to move from a traditional forestry career to one in conservation.

His forestry background has served him well at The Nature Conservancy. “Paul is very well respected by the forest industry,” says Scott Davis, director of TNC’s Tennessee chapter. “He is a good bridge between traditional industrial foresters and conservationists.”

That is why Trianosky was part of the team assembled to negotiate one of The Nature Conservancy’s most complex deals ever. When International Paper announced in July 2005 that it would sell its 6 million acres of timber holdings, TNC requested the opportunity to bid on some of the property—about 220,000 acres in 10 states. “This flew against our normal approach,” says Trianosky. Normally the state chapters work relatively independently in negotiating land transactions, but in this case, he says, they needed to join together. Internal negotiations were just as complex as negotiations between TNC and the various state agencies and nonprofit organizations they proposed to partner with in the land purchase, which was completed in August.

**Randy Boggess**

**Making a name in water resources**

The agricultural library at the University of Illinois, completed in 2001, features a mural called “Ag Time.” In the bottom left corner, not too far from Abraham Lincoln (who signed the bill establishing land grant colleges) and Big Al (the first transgenic pig), is Randy Boggess.

According to Boggess, it was his work on the environmental factors affecting tree growth in southern Illinois that earned him a spot on the mural. But more satisfying to him was his research into precipitation-runoff relationships on a forested watershed in the Shawnee National Forest, also in southern Illinois.

He served a number of roles in the American Water Resources Association, including president in 1969 and editor of the association’s journal, a position he held three times for a total of 10 years. As editor, he impressed a freshly minted PhD named Kenneth Reckhow, now professor of water resources and chair of the division of Environmental Sciences and Policy at the Nicholas School. “He listened to me when I complained about manuscript reviewers for the

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“Carolina Dream” by Paul Trianosky ©Thornrose Music, BMI

C F
In the shade of a Carolina forest
C G
We rested by a cool mountain stream
C Am F
To the melody of gently flowing waters
G C
We drifted into Carolina dreams

Chorus
F C
Will our love flow as free as a petal on the breeze
G
Can dreams live beyond the morning light
C F
If I should wander back to that Carolina stream
G C
Will I see your reflection by my side

Through the years my heart has never wandered
From dreams of love that might have been
Many nights have faded into morning
While I hold to my Carolina dream

The moonlight glistens on the water
The breeze is gentle in the pines
All alone I stare into the starlight
And wish for the days when you were mine

Want to put “Carolina Dream” on your MP3 player or listen to it on your computer?

Go to www.nicholas.duke.edu/dream where you will also find “Mississippi Sawyer” by the Grayson Highlands Band from their Live at the Blue Ridge Music Theater CD. You can order the CD by contacting Jerry Smith at smithsingers@skybest.com.
journal, and he gave me conversation time at AWRA national conferences. For a young faculty member, fresh from graduate school, that was extremely meaningful and important to me,” says Reckhow.

A sabbatical in 1967–68 led to a long-term relationship with Dr. Charles Stockton at the University of Arizona’s Laboratory of Tree Ring Research in 1968. In 1978, five years after retiring from the University of Illinois, Boggess joined Stockton for an 18-year period of fruitful research and consulting. Complete retirement came in 1993, when, as he puts it,”the money ran out.” Now 93, he lives in Austin, Texas.

Paul Trianosky
Challenges ahead for forest conservation
Trianosky, who received his MEM degree the year that Boggess “completely retired,” has seen the completion of a story that began not too long after Boggess completed his forestry degree. In the 1940s, companies like International Paper expanded their holdings, and during the last half of the century, numerous graduates of forestry schools found careers managing the company’s timber holdings and those of other paper companies. IP’s decision in 2005 to sell its land is part of the shifting landscape that Trianosky believes will create complex new challenges for the forest conservation community.

“Under industry ownership, there was stability,” he says. The investment organizations that are buying up the lands will evaluate their “highest and best use,” and many of the lands will be sold for development. A shorter ownership window and a fragmentation of vast holdings could adversely affect the overarching goals of managing these lands for biodiversity, says Trianosky.

Trianosky is charged with collaborating with various state chapters to address this challenge. He thinks a great deal about applying the concept of ecosystem services, such as carbon sequestration and watershed protection, to attract investment dollars.

A Shared Love for Duke Forest
In April, Randy Boggess attended the Nicholas School’s annual Field Day, which was also a celebration of Duke Forest’s 75th anniversary. When he was presented with a T-shirt whose historical photo showed a vintage truck crossing New Hope Bridge, he told current students and staff that he remembered driving that very truck during his time working at Duke Forest. He has other memories of the Forest, fond ones, like the exceptional Loblolly Pine stand behind gate 7, and not-so-fond ones, like the chiggers he hosted during his Forest Surveying class exercises in the New Hope division.

Some 53 years later, Paul Trianosky took a course at the School of the Environment in which teams were assigned to assess a proposal to site a landfill in a part of Duke Forest in Orange County. Working in teams, they visited the site to learn about its geology and topography, but it wasn’t a field course, and much of their work involved reading and research. “We came to the conclusion that Duke Forest, with its history of research, was too rich a resource for this use,” he says.

Lisa M. Dellwo is a freelance writer in Durham.

web sites TO NOTE

The Nature Conservancy
www.nature.org

“Ag Time” mural featuring William “Randy” Boggess (interactive)
www.library.uiuc.edu/agx/jacksonmural.html

Alumni Ira Miller F’40 (left) and Randy Boggess F’40 with Duke Forest Resource Manager Judd Edeburn at the Nicholas School’s Field Day and Duke Forest Anniversary Celebration. Photo by Bobbie Reeves
The Business of Reducing Global Warming
Duke grad mixes interests in environment and entrepreneurship in new eco-capitalism venture

by Laura Ertel

Alicia Seiger lives at the intersection of entrepreneurship and the environment. She got there on a road that started at Duke University.

Seiger is vice president for corporate sales and business development for TerraPass Inc., a new eco-capitalism venture in San Francisco. Calif., that helps individuals and businesses offset their carbon dioxide emissions. She says she first became interested in the environment as a Duke undergraduate in the early 1990s.

"During my freshman year I took an environment seminar, and we read Al Gore’s Earth in the Balance. That was a very formative class and book for me. There was always something ‘green’ in me, but that class really illuminated ideas and issues around sustainability."

Seiger, who always had an entrepreneurial streak, designed her own curriculum at Duke, a combination of environmental science and policy and cultural anthropology. She added a study abroad program in Australia, where she explored how humans interact with their environment.

Upon graduating from Duke in 1996, Seiger hoped to find a job in the environmental arena, but her entrepreneurial interests led her to a start-up Internet marketing company. "I loved creating a business and defining a new space. But ultimately it didn’t have the meaning I was looking for, or the impact on things I felt were important," she says.

So Seiger headed to the Stanford Graduate School of Business to gain some skills to help her pursue her passion. When she graduated with an MBA in 2002, another opportunity presented itself: to write case studies for Stanford’s Center for Entrepreneurial Studies, where she learned even more about entrepreneurship. Eventually, former colleagues lured her to Wine.com. She enjoyed it there, but she really wanted to be in a position that used her zeal for entrepreneurship to effect social change.

That opportunity came in November 2005, when she became the second employee at TerraPass (www.terrapass.com). The San Francisco-based, for-profit environmental startup gives environment-conscious individuals the opportunity to reduce their impact on global warming by funding renewable energy projects such as wind farms and methane capture. Each TerraPass member’s contributions to such projects are intended to offset their "carbon footprint—the carbon dioxide created when they drive, fly, or use electricity.

TerraPass pools its members’ fees and invests them in clean energy production. All of the company’s offsets and sales transactions are verified by an independent auditor, the nonprofit Center for Resource Solutions. Since the company sold its first TerraPass in November 2004, TerraPass registered more than 9,000 members and reduced more than 150 million pounds of CO2—the equivalent of taking roughly 17,000 cars off the road—by funding nine clean energy projects. Ultimately, the company hopes to reach one million members and offset 10 billion pounds of CO2 emissions, a leading cause of global warming.

With the small staff—it’s now up to five employees—Seiger has her hands in just about everything, but her main responsibility is to develop a business channel for TerraPass and to build strategic partnerships to gain greater access to consumers.

“We have a great consumer brand and product, and I’m looking at the challenge of adapting that to meet the needs of businesses.”

TerraPass’ enterprise services are designed to help businesses become carbon-neutral through custom programs ranging from offsetting the emissions from their mobile sales force, to corporate air travel and on-site energy use.

She says “Having a TerraPass program is a great way for companies to communicate to current and potential employees and to their customers that they care about the environment. In addition to communicating company values, some businesses also look to us to help them prepare for anticipated regulatory changes.”

Seiger says the most valuable thing she learned at Duke was how to learn, think, and communicate. “I am thankful that I was able to study at such a well-regarded university as Duke, and in particular at Duke’s school of the environment. The school’s great reputation gives me credibility. In a for-profit environmental business, people want to know that you’ve cared about this issue and studied it for a period of time—and I can point to that from my years at Duke.”

Seiger notes that, while there are nonprofit organizations focusing on carbon reduction and global warming, TerraPass decided to join the growing group of for-profits in this realm.

“We are certainly an experiment in eco-capitalism. And that experiment has been a fascinating and rewarding experience. We believe that you can ‘do good and do well’—that you can have a successful business with a product whose output is positive environmental impact.”

And, while her road to TerraPass may have started at Duke, you can bet that Seiger has already cancelled out any carbon emissions she created along the journey.

Laura Ertel is a freelance writer based in Durham, N.C.
Q.

It’s been awhile since I’ve looked for a job, and I see many organizations only accept online applications. What advice can you offer on how to approach them?

A.

Many employers have taken advantage of the convenience and speed of the electronic age in their operations, and probably the most visible public use is in the hiring process, says Glenda Lee, assistant director of Career Services at the Nicholas School. Most have their own job posting Web site or they contract with external job posting services such as monster.com, usa.jobs.opm.gov, and environmentalcareer.com. Through this media, employers often receive hundreds of applicants for a single position. With so much competition, the savvy applicant must use every technical and human resource available to be selected. Here are a few suggestions to make that happen:

- Follow the directions, correctly enter data into the correct field, and complete all fields. Sounds like a no-brainer? It’s not for many. Be mindful that employers go through a process of screening out applicants before deciding who will be in the “yes” pile. With so many to choose from, it’s easy to put someone in the “no’s” for a simple mistake.

- Tailor your application and resume for the position you are applying to.

- When describing your achievements and contributions, include key-words from the job ad and those you know are important to this role. The keywords are the ones a manager will use in a database search to choose potential candidates.

- Use the “comments” section to describe transferable skills (leadership, project management, community outreach, fundraising, etc.) that you may have gained through your value-added experiences in volunteer and professional organizations.

- Make sure your e-mails always have a professional tone. No shorthand such as “ur” for “you’re” or “i” for “I.” Use the subject line to clearly state why you are writing, for example, “Candidate for Marine Conservation Program Manager.” It also is a good idea to write and proofread the e-mail before typing in the recipient’s e-mail address. This will help you avoid those accidental sends. Finally, ask permission before including your e-mail without reading it because of the attachment.

- Protect your privacy or you may have a part-time job retrieving your identity. A November 2005 security report found job Web sites sell resumes to other Web sites. For a full copy of this report and detailed suggestions on how to protect your privacy, go to www.jobsearchprivacy.org.

- Finally, make human contact. Nicholas School alumni are everywhere. Search the Alumni Career Network to find out if an alumnus works in the organization for which you are applying and request their suggestions on how to advance your application. If none are there, alumni could still help you locate others who may be willing to put you in contact with the right person inside your desired company.

Let’s face it; for now, humans do still make the hiring decision. As always, feel free to contact Glenda S. Lee for advice, at 919-613-8079.
Dan Kincaid MF’73 is on an intergovernmental assignment from the USDA Forest Service to the West Virginia Division of Forestry, where he is serving as the deputy director for the agency at its headquarters office in Charleston. Dan is a 30-year employee of the Forest Service, having served in various capacities in North Carolina, Ohio, West Virginia, Minnesota, and Georgia. Most recently he was district ranger for the Athens Ranger District, Wayne National Forest, in Ohio.

Forest Entomology in East Africa: Forest Insects of Tanzania, a book that is the result of a 20-year effort by Hans G. Schabel F’74, is being published by Springer Scientific Publishers. Hans is a professor of forestry and director of the International Resource Management Program at the College of Natural Resources for the University of Wisconsin at Stevens Point, Wis.

David Paylor T’75 was appointed director of the Virginia Department of Environmental Quality in January 2006. Dave also is an active member of the Environmental Council of the States, serving as the secretary/treasurer and chairman of the Cross-Media Committee. He lives in Richmond, Va., with his wife, Lesa, and children, Kelsey (13) and Grant (10).

George Dickison MS’80 (Forestry) has been named as director of the Natural Resource Program Center (NRPC) for the National Park Service in Fort Collins, Colo. The NRPC provides leadership, expertise, and scientific information to ensure the natural resources of the NPS remain unimpaired for future generations. The NRPC includes the Division for Air Resources, Biological Resource Management, Environmental Quality, Geological Resources, and Water Resources as well as the offices for Inventory, Monitoring, and Evaluation, Natural Resource Information Systems, and Education Outreach.

Craig Stow PhD’92 and his wife, Tara Kidd Stow MF’89, have moved from South Carolina to Ann Arbor, Mich. Craig is working for NOAA at the Great Lakes Environmental Research Laboratory. The research laboratory is actively involved in research on ecological prediction, aquatic invasive species, physical environment prediction, and environmental observing systems.

Spencer Crowley T’96 (ESP) and his wife, Nikelle, are enjoying life in Miami with baby Thomas. Spencer also serves on the Nicholas Alumni Council.

Heather Melchior Schinkel MF’97 is working for the Fairfax County Park Authority as the Natural Resource Management and Protection section manager. She graduated from the Virginia Natural Resource Leadership Institute in June, which was “one of the best experiences I’ve ever had both professionally and personally.” Her husband, Cory, is an applications developer for ESRI, which designs and develops Geographic Information System technology. They married in July in Arlington, Va., which has been their home for several years.

Scott Babcock MEM’99 is now with the Colorado State Parks as a strategic planning program manager in Denver. Scott, his wife Kelly, and their daughter, Claire, also are expecting an addition to their family this fall.

Ashley La Forge and Rick Link (both MEM’99) are happy to announce the arrival of their new baby boy, Renner Sheridan Link, who was born at home on June 8. Ashley is still working as a hydrologist for the US Bureau of Land Management and enjoying her extended summer vacation... um, she means maternity leave. Rick is a structure and pricing analyst for PacifiCorp. They would love to hear from any alums coming to the Portland area—especially if they’re interested in babysitting!

Kris Pickler MEM’99 accepted an offer from Troutman Sanders, an Atlanta–based international law firm. Kris will be located in its Raleigh, N.C., office and practicing in the commercial development and real estate investments and the environmental and natural resources practice groups. He primarily will assist a Fortune Global 25 company with real estate development projects throughout the East and Gulf Coast areas of the U.S., initially focusing almost exclusively in South Carolina, as well as advising other Fortune 500 clients on environmental matters throughout the East Coast. Kris and his golden retriever, Tess, are looking forward to all the activities in the Triangle area, especially fly fishing around the Haw River and Eno River. And as a member of the Alumni Council, he will be accessible to the alumni office.
ABC Nightline aired a segment on a unique tour opportunity offered by Global Explorers. Leading the Way is an opportunity for mixed groups of disabled and able-bodied high school students to participate in life-changing international immersion experiences. The trip featured by ABC went to Machu Picchu in Peru. Nicholas alumni of Global Explorers are David Shurna MEM’99, executive director and co-founder; Julie Ivker Dubin T’94 (BA-ESP) MEM’99, program director and co-founder; Santiago Lobeira MEM’99, field workshop coordinator, who also is with Sustenta Soluciones in Mexico City. You can watch the segment by clicking on the link under VIDEO: Blind Hikers Scale the Andes at http://abcnews.go.com/Nightline/story?id=2185199.

Katie Barnas MEM’01 married Jason Topey in September 2005, and they are living in Seattle where Katie works in the conservation biology division of NOAA’s Northwest Fisheries Science Center. Scientists there use novel genetic and quantitative methods to paint an accurate picture of marine biodiversity in the region. They are also concerned with identifying risk factors, understanding the limits on natural productivity, and doing status reviews for potential listings under the Endangered Species Act. P.S. Katie didn’t share this, but we found out that she was recently named one of the 2005 NOAA Fisheries Employees of the Year. Awardees were recognized for their contribution to the agency during a ceremony at NOAA Fisheries Headquarters in Silver Spring, Md., in April.

Amy Bleckinger James MEM’01 has taken a job with the North Carolina Department of Transportation’s Natural Environment Unit, after stints with the North Carolina Wildlife Resources Commission and the State’s Division of Parks and Recreation. She will be doing biological surveys, permitting, and wetland and stream delineations associated with transportation projects. Also, in 2005, she married Daniel James and welcomed their first child, Sydney Anne, into the world.

Congratulations are in order for Wendy McCausland MS’01 (Geology) who, in addition to earning her PhD, has been selected for a Mendenhall Postdoctoral Fellowship at the University of Washington Department of Earth and Space Sciences in Seattle. In October 2006, Wendy started working on a project called “Studying Slow Earthquakes in Cascadia with Borehole Strainmeter Data.”

Oleg Martens MEM’04 is employed by MRAG Americas Inc. out of Tampa, Fla., as a project manager and fishery management specialist. Oleg has been managing several different socioeconomic surveys of the U.S. shrimp fishing industry throughout the Gulf of Mexico and South Atlantic states for NOAA Fisheries. MRAG Americas Inc. is an independent consulting business dedicated to promoting responsible, rational and sustainable utilization of aquatic resources.

the Duke Environmental Leadership Program

Learning is a Lifelong Endeavor at the Nicholas School

The Duke Environmental Leadership (DEL) Program serves as the continuing education arm of the Nicholas School, providing unique opportunities for environmental professionals to hone your environmental management skills and stay on top of new developments in the field.

We provide these opportunities through both our Executive Education Program and a DEL-Master of Environmental Management (MEM) degree program. Though you already may have completed your graduate work, the DEL-MEM is a great choice for your fellow environmental professionals who want to continue to work while pursuing a degree from Duke University. Please feel free to pass along the DEL-MEM news to your colleagues!
The Cape Cod Commercial Hook Fishermen’s Association was selected this year by the National Oceanic and Atmospheric Administration (NOAA) for one of 10 “Environmental Hero” awards, given to individuals and organizations who volunteer their time and energy to help NOAA carry out its mission. CCCHFA is well populated by Nicholas School MEM graduates and current students, including Paul Parker MEM’97, executive director and Nicholas School 2006 Rising Star Alumni Awardee and Alumni Council member; Mel Sanderson MEM’04, Eric Brazer MEM’05 and interns Justin Rivera and Katie Latanick.

In between trips to Africa, Melanie Biscoe MEM’05, who is working as an Environmental Scientist for RTI International, has been coordinating research for and writing the U.S. Agency for International Development’s Programmatic Environmental Assessment for Malaria Vector Control.

Deaths
Charles Wesley Barney PhD’47 (Forestry), June 17
Frank E. Cairns, Jr T’47, MF’50, June 12
William “Bill” D. Heiss MF’55, Jan. 14
Eddie R. Wagoner MF’49, March 27
Clayton J. Wray MF’51, Feb. 12

What’s your news?
New job? New baby? Professional honor? Recent wedding? Your classmates want to know! Send your news (and photos) to:

Carol Dahm
Director of Alumni Affairs
Nicholas School of the Environment and Earth Sciences
Duke University • Box 90328 • Durham, NC 27708-0328
919-613-8001 • E-mail: cdahm@duke.edu

Upcoming Courses
(Offered at Duke in Durham, N.C., unless otherwise noted)
Current and Emerging Issues in NEPA
Nov. 15-17
Implementation of the National Environmental Policy Act
Dec. 4-8
Environmental Communication for Behavior Change – Online course Jan. 16-Feb. 25
Socioeconomic Impact Analysis under NEPA
Jan. 24-26
Accounting for Cumulative Effects in the NEPA Process
Feb. 28-March 2
Scoping, Public Involvement and Environmental Justice
March 28-30
Ecological Risk Assessment: Theory and Practice
May 21-25

Nicholas School alumni receive a 10 percent discount on all short courses
DEL offers a Certificate in the National Environmental Policy Act (NEPA), co-sponsored by the Council on Environmental Quality, Executive Office of the President. This program is designed for professionals seeking essential skills in the understanding and implementation of NEPA.

In addition to open enrollment classes, DEL offers a Custom Course Program to meet clients’ specific training needs.

For more information on upcoming short courses, our NEPA Certificate Program, our Custom Course Program and other new and exciting programs, please visit our Web site at www.nicholas.duke.edu/del or call 919-613-8082.

We look forward to meeting your continuing education needs.
Benenson Gives $92,000 to Support Nicholas School’s Undergraduate Education

Lawrence B. Benenson T’89 of New York, N.Y., a Nicholas School Board of Visitors member, has made a contribution of $92,000 to the school in a dual effort to support environmental undergraduate education at Duke and to help raise environmental awareness at the university and across the state.

Benenson, executive vice president of Benenson Capital Partners LLC, has pledged $67,000 to create a writing class for first-year students under the university’s mandatory Writing 20 program to enhance the students’ abilities to interpret and communicate environmental information. The program previously has not had an environmental component.

Benenson’s contribution will be matched with a $33,000 Duke grant from the Andrew W. Mellon Foundation to support an Environmental Teaching Fellow, a postdoctoral student with experience in an environmental field who will teach the course.

He also pledged $25,000 for the school to develop a partnership with Duke Radio Network for the 2006-07 basketball season to create a special feature that will raise awareness of the environment to a wide audience and a series of ads that will focus the attention of listeners on the Nicholas School’s undergraduate programs in environmental sciences/policy, earth and ocean sciences, and the Duke Marine Lab.

With 30 affiliated stations throughout North Carolina and Virginia, the Duke Radio Network reaches students, alumni, and area basketball fans—those who listen at home and lucky ticket holders who tune in in their cars before and after games. In Durham it broadcasts over WDNC Sports Radio 620 AM.

“Lawrence’s gift provides the Nicholas School with the ability to present a broad range of environmental issues to all of Duke’s undergraduates and engages them to be more responsible global citizens,” said Krista Bofill, director of Development and External Affairs for the Nicholas School. “Environmental awareness will make an impact on their future decisions both at work and home. I hope everyone tunes in to WDNC Sports Radio 620 AM during Duke’s Basketball season and learns about at least one environmental issue.”

Explorers Gift Club Helps Celebrate Duke Forest Anniversary

As part of the Nicholas School’s annual recognition program for its Environmental Explorers Gift Club ($1,000+ donors), the Annual Fund and Alumni Affairs staff organized a unique celebration in April marking the 75th anniversary of the Duke Forest.

Led by manager of Duke Forest Judson Edeburn, the group was able to visit several research sites including those of Emily Bernhardt, assistant professor of environmental sciences and policy, who is researching the recovery of biogeochemical function in degraded stream ecosystems; James Clark, H.L. Blomquist Professor of Biology, who is working on the development of a wireless sensor network to measure environmental change; and Robert Jackson, professor of biology and environmental sciences and director of the Center for Global Change, who is working at the Free Air CO2 Enrichment (FACE) site on creating a forest of the future.

The day ended with dinner in the forest, with founding dean of the Nicholas School and professor of ecology Norman L. Christensen Jr. presenting a history of Duke Forest.
The Financial Aid Initiative

These friends of the Nicholas School made leadership gifts to the Nicholas School Financial Aid Initiative campaign, which is part of the Duke University campaign to raise $300 million in endowment funds for financial aid. The students, faculty and administration of the Nicholas School extend their deepest thanks to these individuals who have set a wonderful example of generosity. We ask our alumni and friends to join them in supporting this important initiative that will have a lasting impact on the school and on our world.

Dr. Daniel A. Gregorie T’71 and Margaret G. Gregorie T’71 of Castine, Maine, with a gift of $250,000 and a Financial Aid Initiative match of $250,000

Terry Hord Little and Carolyn Odom Little WC’65 of Panama City, Panama, with a gift of $100,000 and a Financial Aid Initiative match of $100,000

Sally S. Kleberg WC’66, P’91, P’94 of New York, N.Y., with a gift of $100,000 and a Financial Aid Initiative match of $100,000

To date, the Nicholas School has raised $2.7 million for the Financial Aid Initiative, including matching money, with a goal of $5 million by December 2008. For more information or to establish an endowment, contact Krista Bofill in the Office of External Affairs at 919-613-8035 or k.bofill@duke.edu.

2005 — 2006 Annual Fund Honor Roll

The Nicholas School of the Environment and Earth Sciences wishes to thank all of the alumni, parents and friends who generously contributed to the Nicholas School, Duke Marine Laboratory and Earth and Ocean Sciences/Geology Annual Funds. Your ongoing support plays a vital role in the continuing success of our students, faculty and school programs. This list recognizes gifts received for the Annual Fund from July 1, 2005 through June 30, 2006.

We also recognize those gift club members who are Environmental Pacesetters. Their consecutive giving years are noted in parenthesis after their name.
In order to conserve paper and resources, the Nicholas School lists leadership gifts qualifying for Annual Fund Gift Club status only. All gifts are deeply appreciated. We have made every effort

* Deceased         ( ) indicates consecutive years of giving to the Annual Fund

we are sincerely grateful for this support.

as part of a company matching gift program,

financial assistance for faculty or students, or

the contributions were given as direct gifts,

areas of need in the Nicholas School. Whether

This list is a compilation of the corporations and foundations that contributed to various areas of need in the Nicholas School. Whether the contributions were given as direct gifts, financial assistance for faculty or students, or as part of a company matching gift program, we are sincerely grateful for this support.

Accenture Foundation Inc.  
Aetna Foundation Inc.  
Amazon Conservation Association  
American Petroleum Institute  
Amin's Family Practice  
Anonymous  
Amin's Family Practice  
Anonymous  
Amin's Family Practice  
Anonymous  

Graduating Class of ’06 Gifts  
Ms. Katherine K. Armstrong F’06 MF’06  
Mr. Thomas P. Augspurger F89 G96  
(Mr. Jil R. Augspurger  (2)  
Mr. Patrick N. Augustine T’06  
Ms. Adedola I. Falade T’06  
Mr. James F. Fraser T06  
Mr. Ari S. Friedlaender G06  
Mr. Carlos A. Gonzalez-Stewart T’06  
Mr. Andrew W. Gore T06  
Ms. Maiana N. Hanshaw T06  
Mr. Christopher R. Hardy T06  
Mr. Matthew A. Hemme T06  
Ms. Kimberly E. Hodgman T06  
Ms. Esther R. Houseman T06  
Mr. Brian D. Johnson T’06  
Ms. Jessica S. Johnson T06  
Mr. Matthew G. Johnson T06  
Mr. William S. Kaufman T06  
Mr. Aaron J. Levine T06  
Ms. Susan M. Lim T06  
Mr. John M. Miller T06  
Ms. Hayes D. Neely T06  
Mr. Jacob S. Pelley T06  
Mr. Margaret E. Peloso T05 G06  
(2)  
Mr. Andres Potes T06  
Mr. Keith H. Rand T06  
Mr. Daniel E. Riley T06  
Ms. Emily F. Roemer T03  
Mr. William M. Rosenthal T06  
Mr. Daniel P. Sheeren T06  
Mr. Gene S. Sherill III T05  
Ms. Erica R. Staateman T06  
Ms. Cecilia H. Shindo T06  
Ms. Swee S. Tan T06  
Ms. Lauren E. Tucker T06  
Mr. Lucas E. Wilkinson T06  
Ms. Charla N. Wilson T06  
Mr. Erika S. Woolsey T06  
Ms. Stacey A. Yee T06  

CORPORATE AND FOUNDATION SUPPORTERS 2005-2006

This list is a compilation of the corporations and foundations that contributed to various areas of need in the Nicholas School. Whether the contributions were given as direct gifts, financial assistance for faculty or students, or as part of a company matching gift program, we are sincerely grateful for this support.

Fifth Third Bank  
Financial Marketplace Inc.  
Ford Foundation  
Forests of the World  
Foundation for the Carolinas  
Freddie Mac Foundation  
Foundation McNamara Inc.  
General Electric Company  
Walter and Lillian Gettner Foundation  
GladsSmithKline Foundation  
Goulder Family Foundation  
Graybar Electric Co Inc.  
High Desert Ecological Research Institute  
Tim and Karen Hixon Foundation  
IBM Corporation  
Innovative Emergency Management Inc.  
Edith B. and Lee V. Jacobs Fund No. 3  
Jewish Community Foundation of Greater Kansas City  
Johnson & Johnson  
Robert Wood. Johnson Foundation  
Joint Oceanographic Institutions Inc.  
Junetia N. Dix Consulting Inc.  
JustGiv  
Kerr Consulting  
Key Foundation  
Land Trust for the Little Tennessee  
Lazar Foundation  
Robert E. Lauck & Associates  
El Luly & Company Foundation  
Lotec Wireless  
MedWestVaco Foundation  
Merck Company Foundation  
Microsoft Corporation  
Mid-Atlantic Fishery Management Council  
JP Morgan Chase Foundation  
Munchinc Foundation Inc.  
Curtis & Edith Munson Foundation  
National Alliance for Autism Research Inc.  
National Wildlife Federation  
Nationwide Foundation  
Nicholas Family Charitable Trust  
North Carolina Assessing Corporation  
North Carolina Biotechnology Center  
North Carolina Coastal Federation  
North Carolina State University  
Oak Foundation  
Occidental Petroleum Charitable Foundation  
William and Jane Overman Foundation  
Paccar Foundation  
David and Lucile Packard Foundation  
Panaphil Foundation  
Pearson Education  
Pew Charitable Trusts  
Pfizer Foundation  
PfE Corporation  
The Plasticsmich Inc.  
Plaza Hardware Inc.  
Point Reyes Bird Observatory  
Prentice Foundation Inc.  
Julian Price Family Foundation  
PricewaterhouseCoopers LLP  
T.Rowe Price Program for Charitable Giving  
Procter + Gamble Foundation  
Rhode Island Zoological Society  
Rudder’s Gun Service Inc.  
Z. Smith Reynolds Foundation  
Salisbury Community Foundation  
Scana Corporation  
Schecter Foundation  
Selmanberger  
The Scholarship Foundation  
Schwab Fund for Charitable Giving  
Siebel Family Charitable Foundation  
Alfred P. Sloan Foundation  
SMT Detergent Corporation  
Seth Sprague Educational & Charitable Fund  
Stanford University  
State Street Boston Corporation  
Surdna Foundation  
Edna Bailey Sussman Fund  
Syngenta  
Takeda Pharmaceuticals North America Inc.  
TAUDP Fund  
Temple-Inland Foundation  
Thorensen Foundation  
Total E&P USA Inc.  
Triangle Community Foundation Inc.  
United Parcel Service Foundation  
University of Minnesota  
Vanguard Charitable Endowment Program  
Vanguard Group Foundation  
Veizion Foundation  
Wade Law Office  
Wallace Genetic Foundation  
Weichert Kuhnbiel Family Foundation  
The Westwind Group Inc.  
Well Foundation  
The Westwind Group Inc.  
Weyerheuser Company Foundation  
Widescate Inc.  
Wilbanks, Smith & Thomas Asset Management LLC  
Wildele Computer Inc.  
Winston-Salem Foundation  
Woodrow Wilson National Fellowship Foundation  
World Wildlife Fund  
Xerox Corp.  
HERITAGE SOCIETY  
The Heritage Society was founded in 1989 to honor those alumni and friends who have made provisions for Duke in their wills or through another type of planned gift. The fol- 

lowing individuals are those who have noti-

fied us that they have arranged for planned 

gifts that will benefit the Nicholas School.

Anonymous  
Anonymous  
Anonymous  
* Mr. Bernard M. Blanchard P80  
Mr. Charles F. Blanchard T45 L49 P90  
(16)  
* Dr. Willis E. Brown III T74  
Ms. Photina Brown  
Mrs. Maria K. Collins P83  
(2)  
Dr. William A. Collins III P83  
(2)  
* Mr. W. Horace Corbett T38 P83  
Mrs. Valera Corbett  
* Dr. Frederick T. Eastwood T41 H50  
Mcr. Yorke L. Eastwood WC40  
(11)  
Mrs. Elizabeth O. Harper  
* Dr. Vester Harper G43  
Rep. Mary Price Taylor Harrison T80  
(13)  
Mrs. Lois-Ann Schack Hugg  
(25)  
Mr. Richard E. Hug T56 F57  
* Dr. Herbert D. Kerman T38 M42 H43 H49  
P80 P165  
(2)  
* Mrs. Ruth Rice Kerman WC39 P180 P65  
Ms. Betty Rushing Lineberger WC49  
(3)  
Dr. Henry O. Lineberger Jr. T50  
(3)  
Dr. James A. Marsh Jr. T63  
(3)  
Mr. Elliott B. McConnell Jr. T51  
Mrs. Sara Gerber McConnell WC52  
Mrs. Mary Wade Myers WC58  
Miss Shefia Glenn Pew G41  
(25)  
Mrs. Elizabeth B. Reid WC53 P84  
(12)  
Mr. Whitlaw Reid P84  
(12)  
Mrs. Helen McKeever Schwarz P87  
(9)  
* Mr. Robert L. Schwarz T41 P87  
(9)  
Mrs. Hannelore Schwarz P87  
(9)  
Mrs. Nellie M. Semans P90 P91  
(10)  
Mr. Truman T. Semans P90 P91  
(10)  
Mrs. Nancy Watkins Sommer WC52  
(17)  
Mrs. Cheryl Cody Sullivan  
(4)  
Mrs. Isabelle Sullivan  
(2)  
Mr. J. Blake Sullivan P39  
(2)  
Mr. John V. Sullivan P86  
Mrs. Carolyn Thomas WC47  
(4)  
* Mr. Norwood A. Thomas Jr T35  
Dr. Reade Y. Tompkins G45  
(20)  
Mrs. Sarah Bond Tompson N45 N47  
(20)  
* Mr. Charles B. Wade Jr. T38 P68 GP92  
Mrs. Margaret Patterson Wade P58 GP92  
Dr. Lewis G. Zirkle Jr T66 H67 P90 P91 P89  
Dr. Sara Kay Zirkle WC61 M65 P92 P90 P89  

* Deceased         ( ) indicates consecutive years of giving to the Annual Fund

In order to conserve paper and resources, the Nicholas School lists leadership gifts qualifying for Annual Fund Gift Club status only. All gifts are deeply appreciated. We have made every effort to ensure the accuracy of our Honor Roll List. We regret any errors or omissions that may have occurred and ask that you contact us regarding corrections by calling Carol Dahm at 919-613-8001 or by e-mailing to cdahm@duke.edu. The Nicholas School is extremely grateful for your continued support.
The Nicholas School ended Fiscal Year 2006 on June 30, 2006, with a balanced budget. Contributions to the annual fund and earnings on established endowments were essential components of our revenue stream, allowing us to achieve that goal.

Many people don’t realize that tuition supports only about a quarter of the Nicholas School’s annual budget of about $40 million. The largest source of revenue derives from research grants. Indirect cost recovery on those grants supplies about 7 percent of the total revenue.

Just as research grants bring significant funding to the Nicholas School, they also are an equivalent source of expenditures—to get the work done. Expenses for educational programs account for about one-third of total expenses, dominated by faculty salaries and financial aid for our students.

The Nicholas School spends roughly 13 percent of its budget each year to contribute to university-supplied facilities and services, ranging from police protection for our students, to construction of university facilities such as libraries. About 8 percent of our expenditures stem from the facilities we occupy in Durham and Beaufort.

Each year the budget is affected by changes in our success in obtaining research grants and by changes in tuition revenue derived from student enrollment. Other categories of revenue and expense are more constant and difficult to change in response to changing conditions. Nevertheless, the school is in good financial shape thanks to the contributions of our faculty, our students and our loyal supporters.

William H. Schlesinger, dean of the Nicholas School
Mark your calendar for the following dates and monitor our Web site at www.nicholas.duke.edu for additional events.

Nov. 10-11
Fall Board of Visitors Meeting
Duke University Marine Lab
Contact: Michele Wittman
919-613-8039 or mwittman@duke.edu

Nov. 11
Marguerite Kent Repass Ocean Conservation Center Dedication Ceremony
Duke University Marine Lab
Contact: Michele Wittman
919-613-8039 or mwittman@duke.edu

Feb. 2
Duke/Yale Career Fair
Kellogg Conference Center at Gallaudet University
Washington, D.C.
Nicholas Alumni Reception to follow
Contact: Glenda Lee
919-613-8079 or gislee@duke.edu

March 2
Stanback Conservation Internship Program Interview Day
Von Canon Rooms, Bryan Center
Durham Campus
Contact: Glenda Lee
919-613-8079 or gislee@duke.edu

April 1-4
American Association of Petroleum Geologists Annual Meeting
“Understanding Earth Systems: Pursuing the Checkered Flag”
Long Beach Convention and Entertainment Center
Long Beach, Calif.
Contact: AAPG
1-888-945-2274 ext. 617 or convene@aapg.org

April 5-6
Masters Project Symposium
MEM and MF candidates master’s projects presentations
Von Canon Rooms, Bryan Center
Durham Campus
Contact: Erika Lovelace
919-613-8070 or admissions@nicholas.duke.edu

April 14
Field Day
Couch Farm Site in Duke Forest
Contact: Michele Wittman
919-613-8039 or mwittman@duke.edu

April 20
Spring Student Banquet
Location TBD
Contact: Nancy Kelly
919-613-8090 or nkelly@duke.edu

April 26-27
Marine Lab Masters Project Symposium
MEM candidates, Coastal Environmental Management program, master’s project presentations
Duke University Marine Lab
Contact: Belinda Williford
252-504-7508 or bbw@duke.edu

April 27-28
The Nicholas Experience at the Duke Marine Lab
Duke University Marine Laboratory
Contact: Michele Wittman
919-613-8039 or mwittman@duke.edu

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The Marguerite Kent Repass Ocean Conservation Center, the Duke Marine Lab’s first LEED-certified green building, will be dedicated on Nov. 11. Look for a story and photos about the new center in the Spring 2007 issue of Dukenvironment.