mapping out solutions through technology
Mapping Out Solutions

New Technology Gives Pat Halpin and Colleagues the Tools to do Better Science and be Better Resource Managers

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Decorate your desktop with nicholas school wallpaper. See page 28
Pat Halpin and his team in the Nicholas School’s Marine Geospatial Ecology Laboratory have a knack for mapping out solutions.

When Environmental Defense needed a strategy for restoring river herring habitat in eastern North Carolina, Halpin’s team created customized network models that charted the best approach.

They’ve developed datasets and software to help The Nature Conservancy evaluate marine conservation priorities along the southeastern U.S. coast.

And working with colleagues at the school’s Center for Marine Conservation, they’ve developed the Ocean Biogeographic Information System (OBIS) SEAMAP project, a spatially referenced online digital database to track the distribution and abundance of migratory marine animals. A massive undertaking, OBIS-SEAMAP pulls together 188 datasets, comprising more than 1.1 million individual records on nearly 450 species.

Last year, the David and Lucile Packard Foundation awarded Halpin’s lab $1.24 million to launch the Marine Ecosystem-Based Management Tool Innovation Fund, a two-year pilot program intended to get the nation’s most promising new technologies for marine and coastal management into the field more quickly.

“We don’t use technology because we want to be digital librarians; we use it because it lets us do better science and be better resource managers,” says Halpin, who is Gabel Associate Professor of the Practice of Geospatial Analysis.

“At the Nicholas School, we view technology as a tool, not an end in itself,” he says.

Halpin’s team is one of many at the Nicholas School that use advanced geospatial technologies like geographic mapping.
information systems (GIS), satellite remote sensing, field surveying, simulation modeling and global positioning systems (GPS) to create integrated, intuitive tools for conservation, research and teaching.

From marine science to surficial earth processes, from environmental economics to environmental epidemiology, and from landscape ecology to conservation planning, nearly every discipline at the school benefits from, and even requires, the powerful analytical and presentation abilities of geospatial technologies for mapping out today’s environmental solutions.

James Clark, H.L. Blomquist Professor, is developing wireless remote sensing networks to study and predict biophysical changes in forest ecosystems on a scale previously impossible. Dean L. Urban, professor of landscape ecology, uses geospatial network theory to study habitat connectivity and land-use change.

Marie Lynn Miranda, associate research professor, uses spatial modeling and GIS analysis to create more accurate ways to assess the risks posed by lead exposure and other environmental health hazards. Prasad Kasibhatla, associate professor of environmental chemistry, has developed three-dimensional chemical transport models to delineate natural and manmade impacts on Earth’s atmosphere.

A cadre of Nicholas School marine scientists, including Scott Eckert, Larry Crowder, David Hyrenbach, Andrew Read, Catherine McClellan, Andre Boustany and Halpin, use GPS tags, satellite telemetry and other new technologies to track the long-distance migrations of sea turtles and other endangered marine species. Nicholas School social scientists like Karen Eckert, Lisa Campbell and Michael Orbach apply the findings to international policy and conservation management.

Photo of Chowan River area by Bill Lea.com.
And the list goes on and on. Students participate in these projects, and in many cases they play significant roles in developing or refining new applications for the technologies being used.

A case in point is the work by Halpin’s lab to help Environmental Defense develop an integrated conservation management plan to restore the spawning habitat of river herrings in eastern North Carolina.

Though little known outside of eastern North Carolina, the Chowan River once was the center of the East Coast river herring fishery. Originating at the Virginia border, the river flows southeast for 50 miles through a low-lying region of vast hardwood swamps and meandering coastal creeks before emptying into Albemarle Sound near the colonial port town of Edenton, one of North Carolina’s first permanent settlements.

As recently as the 1970s, commercial fishermen hauled in more than 12 million river herrings annually from the Chowan’s shallow, tea-colored waters. Two species of herring, the blueback and the alewife, call the river home. Both are anadromous species—that is, they live as adults in the open ocean but swim back to the freshwater streams of their birth to spawn each spring.

The population and commercial harvest of the herring have declined drastically in the last 20 years in response to a complex interaction of factors, including pollution, loss of riparian buffers, and the construction of dams, culverts and other obstructions that block or limit the fish’s access to spawning grounds up the river. But it is still a spring tradition for locals to hold festivals where they fry this so-called “fish of little flesh” to a crisp and eat it bones and all. “For such a little fish, the river herring has had a big economic, environmental, cultural and historic significance in eastern North Carolina,” Halpin says.

Restoring the species has more than just local importance, he adds. While at sea, the herring are an important prey species for other fish from New York to Florida.

Nicholas School student Fernando Colchero and post-doctoral research associate Ben Poulter worked with Halpin to help Environmental Defense to devise a “least-cost” strategy to reverse the herring’s decline by identifying which dams and obstructions could be removed to open up the largest amount of upstream spawning habitat. A least-cost strategy yields maximum benefits with the least possible cost to the economic and environment.
Colchero is a doctoral candidate at the school; James Clark is his advisor, and Halpin is on his doctoral committee. Poulter received his PhD from the school in 2005 and worked in Halpin’s lab as a post-doctoral researcher before leaving in 2006 to work at the Potsdam Institute for Climate Impact Research in Germany.

Taking what Halpin describes as “an engineering approach to environmental problem-solving,” Colchero and Poulter used statistical models to identify the characteristics of herring spawning grounds and pinpointed locations in the Chowan and its tributaries that matched these characteristics. They then incorporated the ecological and geographic information from these results into network models that yielded a schematic diagram of the river basin showing where spawning habitats were located, and what dams or obstructions existed downriver from them.

Network models are flexible database models designed to represent complex relationships between multiple objects. In traditional hierarchical models, data is organized as a tree of records, with each record having one parent record and many children. In a network model, however, each record can have many parent and child records, forming a lattice-like structure that allows a more natural modeling of relationships between the entities.

By using network models, Halpin says, “We were able to devise a system that allowed us to ask, at every point in the diagram: If we remove this obstruction, how much upstream area of habitat will be reconnected?”

Planners in eastern North Carolina can now use the model to prioritize which dams or obstructions to remove or circumvent first, he says: “It lets them put their limited dollars where they will do the most good.”

David McNaught, a senior policy analyst at Environmental Defense, says the model enables a more strategic approach to protecting, restoring and re-establishing access to spawning habitat for river herring.

“The question was: how to prioritize both habitat restoration efforts and projects to improve access to critical spawning areas?” McNaught says. “Pat and his team added GIS expertise we didn’t have in-house. They created a program that lets us weigh several complex factors simultaneously and identify the most promising opportunities for..."
With a Few Clicks of a Mouse…

Research Associate Ben Best Has Millions of Marine Observations at His Fingertips

By John Kerkering MEM ’08

At first, the map of the British Isles on the plasma flat-screen television above Ben Best’s head appears static and unchanging. A vast, unbroken expanse of tranquil blue surrounds the islands.

But, with a few swift clicks of Best’s mouse, things begin to change. A spectrum of new colors and a flurry of multicolored dots appear across the once-uniform stretch of blue. Each color represents a different ecological variable like sea surface temperature, wave height and wind speed. The dots represent field observations made by researchers starting in the 1990s.

“We have more than a million of those in total,” Best says, referring to the observations, which, in this case, signify specific mammal and seabird sightings in the North Atlantic. “In a few months or so, we should have something more like three or four million.”

He manipulates the program a bit more to show that, with a few more clicks of the mouse, he can make it display a host of other variables from almost any marine ecosystem on Earth, for any year since 1935.

Best is a research associate and doctoral candidate in Pat Halpin’s Marine Geospatial Ecology Laboratory.

The map he is “playing around with” is the Ocean Biogeographic Information System – Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP), a groundbreaking online geo-archive of oceanographic data that is unrivaled in its breadth. (See it online at seamap.nicholas.duke.edu.)

The SEAMAP program currently contains 188 datasets and more than 1.1 million records of species sightings. A veritable clearinghouse of data, it is the place to go for biogeographic information on sea turtles, marine mammals and seabirds. Scientists, students, conservationists and policy analysts worldwide can use the map to learn where and when certain species can be found.

photo by Les Todd

By integrating field studies, spatial analysis and simulation modeling, Urban and his colleague, Tim Kitt, then a doctoral student at the University of New Mexico, were able to map out which patches of land in the U.S. portion of the range were best positioned to provide the connected patches of habitat the owls need to survive.

Today, Urban’s Landscape Ecology Laboratory continues to be an innovator in the field of theoretical applied ecology, in which researchers work to develop new analytic tools and approaches to address problems of immediate practical concern.

“Doing cutting-edge science in a way that is practical for people in the field to use is a big focus of what both my lab and Pat’s lab do,” he says.

Halpin concurs. “This is definitely a Nicholas School niche,” he says. “We’re interested in working at the intersection of technology, science and conservation planning.”

One of many innovative projects taking place at this intersection is the school’s involvement in a sea turtle tagging project. In the project, students such as Catherine McClellan, study turtle ecology in the field with Andrew Read, Rachel Carson Associate Professor of Marine Ecology, and then collaborate in the lab with Halpin learning the latest technologies to analyze and manage the data they’ve collected.

“In this day and age, you need to be well grounded in both technology and field ecology,” Halpin says. “Our goal is to teach students the optimization of fish passage around dams or other obstacles.”

Halpin credits Dean L. Urban, professor of landscape ecology and director of the Nicholas School’s Landscape Ecology Laboratory, as one of the first scientists to use network theory to quantify the role of habitat connectivity in large-scale conservation planning.

Urban used the technology as part of a landmark study in the 1990s on the habitat of the Mexican spotted owl. Efforts to protect the endangered owl had been complicated by the sheer size of its range, which covered large, often disconnected tracts of land on either side of the U.S.-Mexico border.

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To make the SEAMAP archive even more useful to decision makers, its observations and survey tracks are combined with remotely sensed imagery to predict marine mammal habitats. This modeling project is funded by the Strategic Environmental Research and Development Program (SERDP), a consortium led by the U.S. Department of Defense.

The project's principal clients are naval environmental officers who use it to study the habitats of “critters of concern such as marine mammals,” Best says.

By predicting where animals are likely to be at specific times of the year, the OBIS-SEAMAP and SERDP projects help organizations like the Navy, conservation groups and commercial fishing fleets avoid or reduce by-catch mortalities and potentially fatal run-ins with marine animals.

Despite his technical prowess, Best didn’t originally set out to make it a career. Growing up in California, he wasn’t particularly interested in computers, even though his stepfather taught computer science at a university. It wasn’t until Best’s undergraduate days at the University of California, Santa Barbara, that he was first introduced to Excel and realized the “power of scripting” and the speed it afforded over manual effort.

Around the same time, he developed an interest in marine science. A general biology major on the pre-med track, Best acknowledged that he was more “jazzed” by the poikilothermic nature of fish than by medicine. At that point, he switched majors to marine biology and never looked back.

In his senior year, he noticed that all the good environmental jobs seemed to require a familiarity with something called “GIS.” Best didn’t have a clue what GIS was, but he thought, “why not, I’ll do it.” He spent a fifth year at UC-Santa Barbara learning geographic information systems technology and taking research diving trips to the Channel Islands, Baja California and Big Sur. It was, he says in retrospect, “the most fantastic time.”

Following graduation, Best held down a number of technology-related jobs, from building Web pages to database management for the European Human Rights Foundation in Brussels, Belgium. He eventually ended up back at the Bren School of Environmental Science at UC-Santa Barbara, feeling that his skill set was “plateauing.” He decided it was time to get back to his core interests—marine ecology and GIS.

It was around this time that friends recommended he talk to a professor named Pat Halpin who was doing cutting-edge work in marine geospatial ecology. Best didn’t originally set out to make it a career. Growing up in California, he wasn’t particularly interested in computers, even though his stepfather taught computer science at a university. It wasn’t until Best’s undergraduate days at the University of California, Santa Barbara, that he was first introduced to Excel and realized the “power of scripting” and the speed it afforded over manual effort.

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It was around this time that friends recommended he talk to a professor named Pat Halpin who was doing cutting-edge work in marine geospatial ecology. The two met over Thai food and beer, and, according to Best, the deal was cinched when it became known that they were both proud owners of 1984 Volkswagen Vanagon Westfalias, complete with pop-tops and kitchenettes.

Four and a half years later, Best says that was the best professional decision he ever made.

“I feel like I’ve landed at the epicenter of marine GIS,” the soft-spoken Californian says as he looks around the Marine Geospatial Ecology Laboratory with obvious pride and enthusiasm. “We’re doing things here that no one else is doing. I’m stoked to be doing this stuff.”

John Kerkering MEM ’08 is the Nicholas School’s student communications assistant for 2006–07.
The Nicholas School dedicated its new 5,600-square-foot Marguerite Kent Repass Ocean Conservation Center at the Duke Marine Laboratory campus in Beaufort, N.C., in a festive outdoor November ceremony.

The Repass Center is the first new academic building constructed at the Marine Lab in 30 years and is the lab’s first green building. It uses geothermal pumps for heating and cooling, solar panels for hot water, and photovoltaic rooftop panels to convert sunlight into electricity. Local building materials, such as yellow southern pine and Atlantic white cedar, and recycled wood are used throughout the structure.

Other eco-friendly features include natural daylight in all spaces, fresh-air ventilation, deep overhangs to provide shade, native landscape and permeable sidewalks, and a zinc roof designed to last 100 years.

The center houses a teaching laboratory, a 48-seat lecture hall equipped with state-of-the-art teleconferencing and videoconferencing facilities to connect to other classrooms and research labs worldwide, and a large, glass-enclosed commons area containing art and sculpture, with views of the Rachel Carson Research Reserve, Beaufort Inlet and Shackleford Banks.

A $2.3 million gift from Randy Repass, chairman of West Marine Inc. of Watsonville, Calif., and his wife, Sally-Christine Rodgers, helped fund the center and create a University Professorship in Marine Conservation Technology at the Marine Lab. The new center is named in honor of Repass’ mother.

During the dedication ceremony, both Repass and Rodgers made remarks expressing the urgent need for action to preserve the marine environment, and they cited the lifelong inspiration that Marguerite Kent Repass has been to marine conservation. The elder Mrs. Repass was in attendance and helped cut the ribbon for the new building.

The center was designed by Raleigh architect Frank Harmon to meet the highest standards for energy and environmental efficiency adopted by the U.S. Green Building Council’s LEED (Leadership in Energy and Environmental Design) program. A grant from the Wallace Genetic Foundation made it possible to design the Repass Center to LEED certification standards.

“The Repass Center represents a major first step in our long-term initiative to make our Beaufort campus a model for environmental sustainability, and it significantly enhances our capabilities for collaborative research, outreach and education,” said Marine Lab Director Cindy L. Van Dover.

William H. Schlesinger, dean of the Nicholas School, said, “Thanks to the vision and generosity of Randy Repass, Sally-Christine Rodgers and the Wallace Genetic Foundation, and to the leadership of Michael Orbach, former director of the Marine Lab who continues to play an integral part in the Repass Center’s development, we have been able to construct a state-of-the-art facility that benefits both our students and our environment.”
Award-Winning Economist Joins Nicholas School Faculty

Richard G. Newell, an award-winning environmental economist widely cited for his work on the economics of climate change and energy, has joined the Nicholas School as the first Gendell Associate Professor of Energy and Environmental Economics.

Newell came to the Nicholas School from Resources for the Future, an independent economic policy think-tank in Washington, D.C., where he continues to serve as a university fellow.

His research centers on the economics of energy markets and policies, particularly on the cost and effectiveness of alternative policies and technologies for reducing greenhouse gas emissions.

"Society faces daunting choices in balancing our energy demands with our desire for a healthy environment. Meeting these challenges involves careful consideration of markets for energy and for energy technologies," Newell says. "My research, teaching and outreach efforts are motivated by a desire to inform and improve domestic and international policies to address these critical energy and environmental needs."

"Anyone who is involved in research or policy work in energy efficiency and climate change has benefited from Richard’s work, especially his seminal papers and articles on the possible impacts of climate change and climate policy on the future economy," says William H. Schlesinger, dean of the Nicholas School. "We're delighted to appoint a scholar of his caliber as the inaugural Gendell Associate Professor."

The Gendell Associate Professorship was endowed as part of a $2.15 million gift in 2005 from Jeffrey and Martha Gendell of Greenwich, Conn., to support an expanded curriculum in energy studies at the Nicholas School. The Gendells' gift, which totaled $2.9 million when matching funds were included, endowed two new full-time faculty positions in the school's Energy and Environment (EE) program, along with an energy research fund, a speakers' series, a visiting executives program and a general fund to support energy innovation.

The EE track provides graduate students with an intensive two-year course of interdisciplinary study culminating in a professional Master of Environmental Management (MEM) degree with a concentration in energy—one of eight MEM tracks offered at the school. Future plans call for extending the EE degree concentration to undergraduates.

In addition to his work at Resources for the Future, Newell is well known in policy circles for his role as senior economist for energy and environment on the President's Council of Economic Advisers in 2005–06. He is a member of the National Academy of Sciences Committee on National Science Foundation Innovation Prizes, which earlier this year issued a report endorsing the use of innovation inducement prizes to achieve a wide range of energy, environmental and societal goals.

Newell also serves on the National Petroleum Council Global Oil and Gas Study Committee, and the advisory board of the Automotive X-Prize, designed to provide an inducement to spur development of a 100-mile-per-gallon vehicle.

Newell received his PhD in public policy from Harvard University. He holds a master’s degree in public affairs from the Woodrow Wilson School of Public and International Affairs at Princeton University and bachelor’s degrees in philosophy and engineering from Rutgers University.
Environment
Dean to Become President of Institute of Ecosystem Studies

William H. Schlesinger, dean of the Nicholas School, has been named the second president and director of the Institute of Ecosystem Studies. He will step down as Nicholas School dean on June 1, and assume his new duties in Millbrook, N.Y.

The Millbrook institute is one of the largest and most respected ecological research organizations in the world, with expertise in aquatic science, forest ecology, urban ecology, air pollution, nutrient cycling and disease ecology.

Provost Peter Lange, Duke's top academic officer, praised Schlesinger, the James B. Duke Professor of Biogeochemistry, for having done an "excellent job" as dean, adding, "We will regret his departure."

"During his time as dean he has made a number of truly outstanding faculty hires, grown and improved the school's student population and brought a far higher degree of integration around a common vision to the school's units," Lange said. "He also made substantial progress on the budget challenges the school faced when he became dean and developed the vision for and established the Nicholas Institute for Environmental Policy Solutions to better project the findings and implications of environmental research done at Duke and elsewhere into the world of public and corporate policymaking.

"These are most substantial accomplishments and Bill's leadership will be missed by faculty, students and administrators alike."

A strong advocate of translating scientific research for the public, Schlesinger took over the leadership of the Nicholas School in 2001 and was appointed to his second five-year term in 2005. During his tenure, the school saw a steady increase in enrollment in the professional program, growing 66 percent from 71 to 118 in a class. Giving levels have reached their highest, with the annual fund jumping from $356,000 to $836,000, and major gifts increasing from $2 million to more than $6 million.

With the signing of the $70 million pledge to the school from Pete and Ginny Nicholas of Boston in December 2003, Schlesinger began planning for a new building to bring the Durham units of the school together. He also oversaw the creation of the Nicholas Institute in 2005, which launched its Washington, D.C., office on Nov. 16. Schlesinger championed a series of environmental advertorials that ran on the op-ed pages of The New York Times, which gave the school national exposure and heralded the opening of the Nicholas Institute. He also wrote and published numerous op-eds, testified before Congress and has given dozens of speeches across the country on environmental issues.

Noted for his research on global environmental change, Schlesinger served as president of the Ecological Society of America from 2003 to 2004. He was elected to the National Academy of Sciences in 2003.

"The decision to leave the Nicholas School and Duke University was a difficult one for me. It has been an honor for me to head this school and work with such dedicated faculty and staff members and students," Schlesinger said. "I will miss my friends and colleagues of more than 25 years, but I trust that the school and the Nicholas Institute have a positive momentum that will continue on.

"The Institute of Ecosystem Studies offers me an opportunity to focus on my work and research in a way that a dean cannot, and I look forward to the new challenge," he said.

Schlesinger will maintain his connection to Duke as James B. Duke Professor Emeritus of Biogeochemistry.
Provost Peter Lange appointed a nine-member search committee in January headed by Susan Lozier, professor of physical oceanography and chair of the Earth and Ocean Sciences Division, to conduct a global search for a new Nicholas School dean.

Lange said, “I am grateful to the members of the search committee for agreeing to take on this position of great responsibility. This is an excellent committee, whose most basic charge is to propose three final candidates (unranked) to President Brodhead and me by May 1, 2007. We anticipate an announcement will be made by late spring 2007.”

The site also provides information on the search process and links to the position description and Nicholas School strategic plan.

## Duke Names Search Committee for Nicholas School Dean

In addition to Lozier, committee members are: Ana Barros, professor of civil and environmental engineering, Pratt School of Engineering; Scottee Cantrell, assistant dean for marketing and communications, Nicholas School; Larry Crowder, Stephen Toth Professor of Marine Biology, Coastal Systems Science and Policy Division, Nicholas School; Richard Di Giulio, professor of environmental toxicology, Environmental Sciences and Policy Division, Nicholas School; Simon Rich, Board of Visitors chair (emeritus), Nicholas School; Jim Salzman, professor of law and environmental policy, School of Law and Nicholas School; Jim Siedow, vice provost for research and professor of biology; Dean Urban, professor of landscape ecology, Environmental Sciences and Policy Division, Nicholas School.

Lozier said the committee will work toward bringing several candidates to campus for interviews in April. Although the process is confidential, Lozier promises updates throughout the spring which will be posted on the search Web site at www.nicholas.duke.edu/deanssearch.

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### Bill's Testimonials

*Bill has been a courageous advocate for the environment. We will miss him in North Carolina.*

Fred J. Stanback, Jr., of Salisbury, N.C., Nicholas School Board of Visitors (Emeritus)

*Bill’s booming voice, infectious laughter and his outspoken commitment to the environment make him a force to be reckoned with at Duke and beyond. His support of the Nicholas School faculty, students and staff make him an ideal colleague and boss. As a staff member who has had the privilege of working with and for Bill for the last six years, I will miss his encouragement, his support, his sense of humor and his leadership. It has been a true joy knowing Bill!*

Cynthia Peters, assistant dean for enrollment services, Nicholas School

*Bill has accomplished a great deal during his (too-brief) tenure as Nicholas School dean. He has encouraged and overseen the growth and diversification of our professional environmental management degree program, and he moved the school into new endeavors such as programs in energy, and environmental health and security. He has placed a high priority on faculty development and the results of his efforts are evident in both the numbers and the quality of our faculty. On a personal level, he has done much to unite the school, despite its geographic fragmentation.*

Norman L. Christensen Jr., professor of ecology and founding dean of the Nicholas School

*I think Bill has been a remarkable force at Duke for getting the issues surrounding global climate change presented. In this regard he has provided something of a constant drumbeat; one that has clearly raised the visibility of this topic not only within the academic realm but also among the larger public. Bill’s passion for spreading the word about climate change will be sorely missed and in the absence of someone taking his place, Duke will definitely miss him.*

James N. Siedow, vice provost for research, Duke University

*A lot of people say ‘think globally, act locally,’ but Bill actually does it. He has a special ability to see the big picture and to relate to everyone from specialized scientists to the media to the layperson. Bill is willing to stand up and fight for what’s right, whether or not it’s popular, and his friends, colleagues and the environment are thankful for it!*

Jeffrey S. Pippen, Nicholas School research associate and birder extraordinaire

*Bill can explain the intricacies of carbon sequestration and marvel at the courtship display of a woodcock with equal enthusiasm. He understands the importance of scientists venturing from the ivory tower and applying their expertise and perspective to real-world problems. We need more scientists like Bill to engage in and inform the public debate on the significant environmental challenges we face.*

Derb S. Carter Jr., director, Carolinas Office, Southern Environmental Law Center

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Fred J. Stanback, Jr., of Salisbury, N.C., Nicholas School Board of Visitors (Emeritus)
New Group Aims to Protect Durham County Residents From Lead Poisoning Hazards

Recent water samples with high lead levels from a number of Durham, N.C., residences have raised public concern about the safety of the county’s drinking water. To address these concerns, members of the Nicholas School’s Children’s Environmental Health Initiative (CEHI), community advocates, city officials and county public health officials have formed the Durham Environmental Lead Collaborative (DELC).

“DELC’s mission is to protect Durham County residents from lead poisoning hazards from all sources,” said Marie Lynn Miranda, CEHI director and associate research professor at the Nicholas School.

DELC members met for the first time in February and began to draft an action plan to form the basis for a communitywide “Lead Summit,” said Miranda, who serves as facilitator for the group.

In addition to water, other potential sources of lead exposure include deteriorating lead-based paint in dust and soil; lead-containing vinyl miniblinds; traditional medicines or cosmetics; imported food; batteries and hobby materials; and some ceramics and pottery.

The new group will focus its efforts on especially vulnerable populations such as pregnant women and children, she said. It also will place a priority on identifying and testing houses that are considered at risk of exposure from household plumbing and lead paint.

DELC members identified four areas critical to protecting public health: water testing; public education; coordination of blood lead testing; and coordination of testing for lead paint, dust and soil. The group planned to seek community input on its action plans in each of these areas through a variety of activities, including the March summit.

Miranda believes DELC will serve as a model for other communities who wish to bring together diverse stakeholders and establish a common mission and meaningful action plan. “I am very impressed with the many talented and capable people from our community who are participating. The commitment to working collaboratively toward a common mission is absolutely critical to protecting public health,” she said.

Participating DELC members include the Durham City Manager’s Office; Durham Water Management; the Durham County Health Department; the Partnership Effort for the Advancement of Children’s Health; Community Partners Against Lead; the Durham Affordable Housing Coalition; the Durham People’s Alliance; the Durham Department of Community Development; the Durham Department of Neighborhood Improvement Services; the North Carolina Children’s Environmental Health Branch; and the Children’s Environmental Health Initiative.

Orbach Presents on West Coast Marine Resource Management at AAAS

Michael K. Orbach, professor of the practice of marine affairs and policy at the Nicholas School, took part in a symposium panel examining “Emerging Information Needs for Long-Term, West Coast Marine Resource Management” at the 2007 annual meeting of the American Association for the Advancement of Science (AAAS) in San Francisco.

His February presentation, “Human Institutional Ecology in Ecosystem-Based Fisheries Management Regimes,” summarized the elements of the human and institutional ecologies of West Coast U.S. fisheries necessary for a full understanding of the “total ecology.”

The AAAS meeting is the largest general science conference of the year. It attracts thousands of researchers, policymakers, students and reporters from around the world.
Ecologist Named Recipient of 2007 Proctor Prize from Sigma Xi

Stuart L. Pimm, Doris Duke Professor of Conservation Biology at the Nicholas School, has been named the recipient of the 2007 William Proctor Prize for Scientific Achievement from Sigma Xi, the Scientific Research Society.

The Proctor Prize is awarded annually to a scientist who has made an outstanding contribution to scientific research and has demonstrated an ability to communicate the significance of this research to scientists in other disciplines. The prize will be presented at Sigma Xi’s annual meeting this November in Orlando, where Pimm will deliver the Procter Prize Address.

Pimm is widely cited for his research on biodiversity, species extinction and habitat loss in Africa, South America and Central America, as well as the Everglades. His work has contributed to new practices and policy for species preservation and habitat restoration in many of the world’s most threatened ecosystems.

David Hyrenbach Named 2007 Pew Fellow

K. David Hyrenbach, a research scientist in coastal systems science and policy at the Nicholas School, has been named a 2007 Pew Fellow in Marine Conservation.

Hyrenbach’s expertise lies in the habitats of far-ranging marine vertebrates and the conservation of pelagic systems, with special interest in designing management plans and marine protected areas in the open ocean.

As a Pew Fellow, he will receive $150,000 to conduct a three-year conservation project to evaluate the feasibility and effectiveness of establishing marine protected areas in the Alboran Sea.

The Alboran Sea is located between Spain and Morocco in the westernmost part of the Mediterranean Sea. It is home to one of the largest populations of bottlenose dolphins and the last population of harbor porpoises in the region, and is the most important feeding ground for loggerhead sea turtles in Europe. In 2003, the World Wildlife Fund raised concerns about the impacts of widespread drift net fishing on populations of dolphins, turtles and other marine animals in the region.

Institute’s Rafe Sagarin Traces Steinbeck’s Route Through the Sea of Cortez

When the Nicholas Institute’s Rafe Sagarin first moved to the California coast as a college student at Stanford, he bought all the John Steinbeck novels he could find and began exploring his new home through the salty characters of Cannery Row and Tortilla Flat.

It did not take long for Rafe to realize that one of Steinbeck’s most memorable characters, “Doc,” was the fictional version of Ed Ricketts, a biologist and one of John Steinbeck’s closest friends. When Sagarin learned Steinbeck and Ricketts had once gone on an expedition in the Mexican Sea of Cortez, his imagination lit up with the idea of one day recreating that journey, which he did in 2004 with a group of scientists.

The Sea of Cortez, also known as the Gulf of California, lies between the Baja Peninsula and mainland Mexico.

American Public Media’s Dick Gordon recently interviewed with Sagarin, now the Nicholas Institute’s associate director for ocean and coastal policy, about the changes they saw. Sagarin says that the kinds of observations Steinbeck and Ricketts recorded 70 years ago now provide critical data in understanding environmental changes like global warming.

You can listen to that conversation, read the logs from that expedition and find out more about a 2007 museum exhibition focused on this trip at www.nicholas.duke.edu/steinbeckroute.
Moving Forward
D.C. Launch and State Efforts Mark Major Milestones in Nicholas Institute’s Goal to be ‘Go-to Place’ for the Environment

Less than two years after it was established, the Nicholas Institute for Environmental Policy Solutions has passed major milestones in its goal to become the “go-to place” for environmental policy at both the national and local levels.

At the national level, nearly 500 decision makers from business, government, nonprofits and academia took part in events designed to launch the Nicholas Institute’s presence in Washington, D.C., last November.

The launch featured a VIP luncheon at which Sen. John McCain and other national leaders discussed prospects for new policies and legislation aimed at reducing carbon emissions. It also featured workshops for Capitol Hill staffers on climate change and U.S. oceans policy.

“This was the first installment of an ongoing commitment by the Nicholas Institute to take a leadership role in spurring national discussions about environmental policies—especially how we address the serious need to reduce carbon emissions,” says Tim Profeta, Nicholas Institute director.

A full slate of events and initiatives is planned for 2007 to bring decision makers together to discuss environmental issues, Profeta says, and to provide them with policy analysis and framing that is timely, trustworthy and sharply focused.

For instance, following the release of the Intergovernmental Panel on Climate Change’s 4th Assessment Report in February, the Nicholas Institute worked with congressional offices to bring Gabriele Hegerl, a Nicholas School faculty member who was one of the chief authors of the IPCC report, to Washington to provide expert testimony on the report to lawmakers.

“Bringing experts to D.C. to address timely issues such as the IPCC report is one way we are demonstrating to leaders that the Nicholas Institute is a useful partner,” Profeta says.

At the November launch, McCain (R-Ariz.), a 2008 presidential candidate, affirmed his strong commitment to U.S. actions on carbon emissions and said he planned to reintroduce the McCain-Lieberman Climate Stewardship Act. When asked, he predicted that if Congress passes legislation in the next two years to enact a mandatory carbon emissions reduction program, President Bush would sign it.

McCain was joined in his discussion by industry executive Jeffry Sterba, chairman and CEO of PNM Resources and incoming chair of the Edison Electric Institute, a major trade association.

Sterba told the luncheon audience of about 400 that as an electric utility executive he thought it was “important to get started now” with a federal commitment to reduce emissions. His comments were based on a Duke University faculty analysis, conducted for members of industry at the Institute’s request. The analysis examined what types of emissions reduction scenarios could help stabilize the climate. Sterba’s comments foreshadowed later deliberations by the Edison Electric Institute to recommend some action toward reducing carbon emissions nationally.

Following McCain and Sterba’s discussion, U.S. Representative Tom Udall (D-N.M.) and William K. Reilly, president and CEO of Aqua International Partners and former EPA administrator, discussed prospects for climate legislation in the newly Democratic House of Representatives.

D.C. launch videos are online at www.nicholas.duke.edu/institute/dclaunchvids.html.

An Increased Local Presence, Too
On the state level, the institute has named Bill Holman, former secretary of the North Carolina Department of Environment and Natural Resources and executive director of the Clean Water Management Trust Fund, as a visiting senior fellow for in-state environmental outreach.

Holman is working with the institute’s staff to identify new avenues for applying its expertise, and the broad academic resources of the Nicholas School, Duke University and other universities, to North Carolina environmental issues. He is exploring opportunities for creating a new, self-supporting center to unite this multi-institutional expertise and make it readily available to decision makers statewide.

“Bill’s unparalleled depth of expertise on North Carolina environmental policy ideally suits him to lead this initiative,” says Profeta.

“For more than 20 years, Bill has worked with legislators, journalists, advocacy organizations, scientists and landowners to develop and promote economically and environmentally sound solutions to the state’s most pressing ecological challenges,” Profeta says. “He is unquestionably one of the Southeast’s most respected and effective environmental advocates.”

Holman believes the biggest environmental problem facing North Carolina is climate change.

“Global warming and all its associated impacts, like sea-level rise, present a serious challenge, but I believe there are things we can do to mitigate it,” Holman says. “A lot of energy-policy decisions are actually made at the state level. The Utilities Commission and the Environmental Management Commission have quite a bit to say about power plant emissions and vehicle emissions. There are going to be
economic winners and losers in this, and states that make changes early and invest in cleaner technologies are going to be the winners. The Nicholas Institute can definitely play a role in this.”

Holman also believes the institute can help the state’s decision makers find ways to protect the state’s water resources, which are threatened by rapid growth and development.


“Water quantity and quality is a big issue for the future. Our water laws are designed for the last century and are not up to the coming competition for water resources among regions,” Holman says. Luckily, he says, the state’s leaders are actively working to find new and better ways to preserve its water resources, making it a possible candidate to become a model for other states to follow. “This is definitely an area where the Nicholas Institute can bring its expertise to bear for the public good,” he says.

Prior to joining the institute staff in December 2006, Holman served for more than five years as executive director of the state’s Clean Water Management Trust Fund. Before that, he was secretary of the North Carolina Department of Environment and Natural Resources and assistant secretary for environmental protection, and a lobbyist to the North Carolina General Assembly for numerous environmental nonprofits and advocacy organizations.


“Throughout my career, I have had the fortune to collaborate with some of the state’s most visionary leaders and boards, its brightest scientists and most committed conservationists,” Holman says. “Through my work at the Nicholas Institute, I hope to continue and deepen these collaborations.”

The Nicholas Institute was established in 2005 to bridge the gap between academic research and active policymaking. The Institute’s four initial areas of concentration are climate change and the economics of limiting carbon pollutions; oceans governance and coastal development; freshwater concerns; and emerging environmental markets.

— Tim Lucas, Nicholas School and Nicholas Institute
It’s the public’s perception of earthquakes that really shuts down this kind of project in populated regions,” lamented Nicholas School graduate student Dan Kahn. “It is a good idea, Basel’s a great place for it, and the public might start out saying ‘We’re fine with earthquakes.’ Nevertheless, as soon as they feel something, all of a sudden it’s ‘We didn’t sign on for this!’”

Kahn, who recently returned to Duke from Basel, Switzerland, had participated in the city’s attempt to tap a 5-kilometer-deep natural hot zone. Plans call for using pumped-in water, heated to 200 degrees centigrade in the underground fracture system, to drive a pollution-free geothermal power station on the surface. Unfortunately, Basel’s Deep Heat Mining project ground to a halt when efforts to crack the buried hot dry rocks by piping down cold water—a necessary step to initiate the project—set off a magnitude 3.4 earthquake on Dec. 7.

Basel is one of four worldwide ventures where researchers from the Nicholas School’s Earth and Ocean Sciences (EOS) Division’s seismology group are helping explore potential sources of geothermal energy, an energy source that emits no greenhouse gases and offers a clean substitute for petroleum, gas or coal.

The seismology group has developed a special expertise in detecting and using “micro”earthquakes to assess underground structural features at places like California’s San Andreas Fault. It is now using those skills to help scout potential sources of hot underground water for environmentally friendly energy production in response to the needs of geothermal energy prospectors.

A new study, headed by researchers at the Massachusetts Institute of Technology, estimates that tapping stored heat within Earth’s crust could satisfy a noticeable fraction of the United States’ future energy needs at competitive prices without producing waste gases that induce global warming.

In Basel, the Swiss city’s citizens had been warned that earth tremors were an unavoidable byproduct of fragmenting the rock to allow water flow, but the quake so jarred them that authorities suspended the project and announced they would undertake a risk analysis, with a possible delay of up to four years.

Repeated cracking is necessary to create an underground network of fractures large enough to heat the injected water to supply the electric power plant’s turbines. The EOS group’s role was to help trace out
the cracks by monitoring the seismic noise they produced.

“The project just needs another week to finish optimally cracking the rock,” said Kahn. “Then earthquakes won’t be felt anymore. But one has to get through this few-week period first.

“The clean energy would really be good for the community. And if they got the geothermal power plant up and running, similar installations could be put in other cities along the Rhine.”

“Basel is very short on non-polluting energy resources,” said Nicholas School seismology professor Peter Malin, who directs the seismology group. “In fact they’ve actually made it illegal to have air conditioning in the city.”

That industrial city—situated in a Los Angeles–like bowl that traps bad air—may be in Switzerland, but it becomes hot and polluted in the summer. “In my hotel room it was close to 90 degrees Fahrenheit all night long,” Malin said of his July visit.

“The entire Rhine River valley, of which Basel is a part, stretches along what geologists call a graben, a length of crust that collapsed like a pile of pipes upon losing their side-supports, said Malin. The collapse happened about 54 million years ago when what is now Europe began splitting apart but then stopped. Heat tapped by that abortive rifting is still stored several miles below the present valley.

Kahn helped build seven quake-detecting seismometers at Duke for use at the Basel site. He then traveled to Switzerland with Malin to install the instruments in drilled shafts at depths ranging from 300 meters to 2.7 kilometers.

In addition, he created a computer program that coordinates data from various seismographs to generate a kind of earthquake-distribution image, providing clues about what is happening underground.

“What we were hoping was that, when they’re pumping water in to crack the rock, these earthquakes would locate where the cracks are forming,” he said. “By mapping the earthquakes, we can measure the propagation of cracks and the growth of the hot rock reservoir.”

Crucial rock-cracking at the Basel site began Dec. 2, delayed from July because of drilling complications. During the five subsequent days before cracking was halted, the seismographs recorded about 15,000 small quakes—all but a few undetected by residents, Kahn said.

Of that larger number, only about 3,500 tremors were locatable using Kahn’s software. Unfortunately, vibrations from Basel’s subway system complicated those measurements, interfering with input from the four seismometers located nearest the surface.
Despite those difficulties, his computer program seemed to provide useful information on the cracks. "It looks promising," he said. "I have a very good idea from the data what the crack structure in the hot zone is."

"It shows crack growth from the point where the water is being injected. It looks like it's doing what they want it to. But it's not large enough yet to make a commercial pool of hot water to actually start creating power."

**Scouting for Wells Near a Hawaiian Volcano**

While Kahn was in Switzerland, seismologist Eylon Shalev of the Nicholas School’s Earth and Ocean Sciences Division was installing another array of Duke-built instruments within drill holes in the vicinity of Hawaii’s Kilauea volcano.

As project leader, the Israeli-born research scientist and his team lowered a total of eight seismometers, some equipped with tiltmeters, to depths ranging from as much as 700 and as little as 80 feet deep. They will serve as a network to help the existing Puna Geothermal Venture (PGV) power station scout a location to drill new steam wells for power generation.

"PGV now supplies about 20 percent of the electricity on Hawaii’s Big Island," Shalev said. "They’re producing 30 megawatts using water from four wells. The average geothermal plant in the world would need about 10 wells to produce that amount."

The Puna site is at an ideal location: Red hot magma feeding the volcano supplies enough residual heat off to its sides to warm abundant quantities of underground water.

"Kilauea is the most active volcano in the world, but most of the recent eruptions haven’t happened at the summit," he said. "Nowadays the most active place is on the East Rift Zone, about 10 miles from the summit. The PGV plant also sits on that zone, 20 miles from the summit."

"They’re on a dangerous place, no question about it. But, as geothermal plants go, this is one of the most efficient in the world."

But geothermal well prospecting is never a sure thing, said Stephen Onacha, a former geophysicist employee of Kenya Power Generation Co. in Africa’s geothermally rich Rift Valley.

Now on a postdoctoral fellowship at Duke supported by the government of Iceland, he has developed special geothermal exploration methods using earthquakes and electrical properties of rocks.

"One well costs over $2 million," Onacha said. "And the success rate for geothermal wells is still the same as for the oil industry—about 25 percent."

The Nicholas School’s seismology group will try to help increase Puna Geothermal Venture’s odds for its next well with a method they previously used in the vicinity of California’s Mammoth Lakes. There, an uplifting dome at the center of a large volcanic caldera threatens to renew the volcanism that has been a repeat visitor for the past 760,000 years.

In 1997, the Duke team installed a temporary network of 40 surface seismic stations near where Mammoth Pacific LP had built a geothermal power plant in California to tap the underground volcanic systems’ geothermal energy.

That array of seismographs allowed the group to paint a tomographic picture of underground structural features underlying Mammoth Lakes. Somewhat analogous to CAT scans, the computer-based technique involves calculating how waves from swarms of microearthquakes interact with the rock they vibrate through.

"We were lucky to be there at a time when there were a lot of earthquakes," said Shalev.

A followup analysis of that stored data suggested the presence of a promising array of broken rock through which hot underground water could percolate.

"Our new interpretation is that the broken rock forms a kind of pipe, identified in extinct and deeply eroded volcanoes as a 'rubble chimney,'" Shalev said.

That information proved useful as Mammoth Pacific settled on where to drill for a new hot water well, which has since been completed. "I found to my surprise that the place that we thought would be good to drill was actually the location of the first swarm in ’97," Shalev said.

Back in Hawaii, Shalev is using the recently installed seismometer network to create a similar tomographic map for Puna Geothermal Venture’s new hot water well prospecting.

"We can produce a map that will show the amount of cracking in the ground," he said. "We don’t have enough microearthquake data to produce this map yet, but I expect by March of this year we may have plenty of events to work with."

The data have engaged the interest of and will be the dissertation material for volcano seismology doctoral student Kate Lewis Kenedi. "By recording so many microearthquakes, the bore hole seismometers give us a chance to locate fractures under Puna. We’ll help PGV find hot water, and we can work with the Hawaiian Volcano Observatory on volcano hazard mitigation."

While the seismographs listen for new swarms of microearthquakes that are common in volcanic regions, the tiltmeters the Duke seismologists installed at some of those stations will also help the Hawaiian observatory monitor for movements of underground magma.

"Moving magma will push on adjacent rock, which can make the surface tilt," Shalev explained.

**Geothermal Heat Comes Naturally in Iceland**

Onacha has been testing electrical and magnetic methods to track the location of hot underground water in Mammoth Lakes, his native Kenya and in another—this time frozen—nation where abundant volcanism has made geothermal energy a way of life.

In April 2006, Onacha chaired a conference at the Nicholas School on using those methods, plus microearthquakes and tomographic imaging, in Iceland. That three-day meeting brought U.S. and Icelandic scientists together.
"We are working in Iceland because the geology there is well known and less complicated than in other places,” Onacha said.

That country, where visitors can bask in open-air geothermally heated pools at night while watching displays of the aurora borealis, is actually a uniquely high-and-dry portion of Earth’s mid-ocean ridge system, where volcanic lava creates new ocean crust.

Iceland’s rocks are of just one kind: basalt. That contrasts with the situation in Africa’s Rift Valley, where parts of the continent are slowly splitting apart amid a jumble of “all mixtures of rock,” he said.

“In Iceland, the houses are all heated by geothermal hot water, as is water in the showers,” he said. “So you don’t have to heat it up; you just turn on the tap. The water is always hot.”

Many of Iceland’s roads and sidewalks also are naturally steam-heated. And, of course the electric power grid also gets a large portion of its energy from the ground.

While Iceland’s ventures in geothermal energies are well established, those in places like Basel are in their delicate early stages.

In the wake of the magnitude 3.4 earthquake in the Swiss city, a special counsel is now reviewing the safety of the project, Malin reports. “A go or no-go decision is likely to come in the next two to four months,” he said. “A great deal of European Union investment and hopes for geothermal power will rest on the outcome of this decision.”

Kahn will continue to work on the project “for as long as I have the funds and until, hopefully, he is able to finish his PhD,” Malin added.
Diving into Uncharted Waters

Marine Lab Director Cindy Van Dover Literally Wrote the Book on Hydrothermal Vents

By Tim Lucas

A mile and a half beneath the Pacific Ocean, a new world opened up for Cindy Van Dover.

It was 1985, and Van Dover, then just months shy of earning her master’s degree in theoretical ecology at UCLA, was making her first dive in the submersible research vessel Alvin. As the pilot guided the Volkswagen-sized sub into the inky depths of the Galapagos Rift, 2,450 meters below the surface, Van Dover was stunned by what she saw.

Outside her view port, Alvin’s headlights illuminated dense clumps of slender, sleeve-like white tubes rising up from the sea floor with blood-red plumes poking out of their tips like giant lipsticks. Ghostly white crabs and eel-like fish darted between the clumps. Smoke billowed out of lopsided, chimney-like rock formations, and jets of superheated water bubbled up through cracks in the sea floor.

It was the famed Rose Garden hydrothermal vent, an otherworldly sea-floor oasis discovered in 1977 in the waters near the Galapagos Islands, and so named because some scientists thought its tubeworms resembled clusters of long-stemmed roses.

“I remember thinking how extraordinary it was to be there, in this place at the bottom of the sea where humans weren’t supposed to be, and to look out my view port and see a sunless environment filled with animals that were living without input from photosynthesis,” says Van Dover, 52, an internationally respected deep-sea biologist who joined the Nicholas School faculty last August as director of the Duke University Marine Lab. Van Dover, professor of marine biology, also is chair of the school’s Division of Coastal Systems Science and Policy.

“It was amazing, like nothing I had ever experienced before,” she says. “My heart was pounding and my adrenaline was pumping. I was hooked.”

She’s been diving—figuratively and literally—into uncharted waters ever since. Drawn by the alien beauty of the vent...
ecosystems and by the scientific puzzles they pose, Van Dover has made more than 100 dives in Alvin and other submersibles. She’s explored nearly every known vent site in the world, once diving as deep as 4,000 meters in a Russian sub.

In 1990 she became the only PhD scientist and only woman ever to complete the rigorous training necessary to be an Alvin pilot. "It didn’t seem like such a big leap to me,” she says. “If you’re an ecologist, you want to be in the environment you study. On a research cruise, no one spends more time undersea than the sub’s pilots. So to be the best scientist I could be, I realized I had to become a pilot.”

Since then, she’s been pilot-in-command on 48 dives.

Van Dover’s plied new waters as a researcher, too.

In 1989, the same year she earned her PhD from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Program in Biological Oceanography, she published a paper in the prestigious journal Nature that described a novel photoreceptor in a species of blind shrimp found at deep sea hydrothermal vents. That paper, part of a series of papers by Van Dover now considered seminal in the field, led to the discovery and characterization of a geothermal source of light at the vents.

Her research on the geology and biology of hydrothermal vents and their chemosynthetic ecosystems has resulted in more than 70 peer-reviewed publications in Science, Nature, The Proceedings of the National Academy of Sciences, Geophysical Research Letters and other top journals. She also wrote The Ecology of Deep-Sea Hydrothermal Vents, the first textbook on the subject, published in 2000 by Princeton University Press.

In 1997, she wrote The Octopus’s Garden, a.k.a. Deep-Ocean Journeys, a popular nonfiction account of her voyages to the bottom of the sea, intended to introduce general readers to the natural wonders found at hydrothermal vents.

"It’s no exaggeration to say that Cindy literally wrote the book on hydrothermal vents,” says William H. Schlesinger, dean of the Nicholas School. “She’s a world-class scientist, one of the most respected names in oceanography today.”

Van Dover’s fascination with the sea began as a girl growing up in Eatontown, N.J., about five miles from the shore. Her mother took the family to the beach nearly every day in summer. While other kids her age spent their time splashing in the waves, sunning themselves or exploring the shop-lined boardwalks and shorefront amusement parks of Asbury Park, Monmouth Beach and other nearby beach towns, Van Dover loved to explore the surf zone, salt marshes and tidal pools, seeking out horseshoe crabs and other strange creatures that lived there.

"The animals, they are very odd. Horseshoe crabs, why do they look the way they do? I was just fascinated,” she says. “I thought it was very curious that crabs could have so many legs, no hands and eyes on stalks.”

Understanding how such diversity could exist captivated her. "My heroes were Rachel Carson and Jacques Cousteau,” she says. "I wanted to be an explorer.”

The problem was that any time Van Dover got on a boat, she got seasick. Nonetheless, in high school, unable to resist what she calls “the romance of the sea,” she took marine biology and volunteered to work at a Rutgers University shellfish research lab in Monmouth Beach. There, she studied the time it took for clams to self-clean after contamination.

Part of her work was on land, but part had to be done in a round-bottomed oyster boat called the Nelson. "I’d be throwing up every other minute and I’d swear I’d never go back out,” she recalls in an amused tone. "But then, after a few days, the lure was just too strong to resist.”

As an undergraduate at Rutgers, Van Dover continued her research on coastal invertebrates, studying disease resistance in oysters. But, intriguing as shallow-
water species were, she realized her true interest lay elsewhere.

"I was spending my days thinking more and more about what the deep sea was like. About how exciting it would be to go there and explore places no human had ever seen before," she says. "I’d always loved weird animals, and I had a sense that the weirdest ones were in the deep water.

"The dogma back then was that the deep ocean was cold and dark everywhere," Van Dover says. "But I thought, how could that be right? How could animals reproduce in deep seas without seasonal cues like light and water temperatures? An answer had to be out there. We were just missing it. So that’s where I wanted to be.”

Getting there was no easy trick. In 1982 Van Dover was an unemployed marine biologist with limited resources, recurring seasickness and no firsthand experience at deep sea research.

But she did have abundant determination. Parlaying her experience studying larval species of crabs—species that had been found at some of the hydrothermal vents scientists had discovered in recent years—she talked her way into a job as a scientist on a research cruise slated to head to the East Pacific hydrothermal vents later that year.

It would be another three years, however, before she would earn a seat in Alvin and get to see a vent site firsthand.

"That first dive, you really appreciate how extraordinary it is for you to be there,” she says. "You realize the enormity of it—you’re a mile and a half below the ocean in a sub that’s not much bigger than a two-person bathtub. And outside the view port is this other world, this strange world of alien formations and bizarre animals unexpectedly thriving in the most extreme conditions on Earth.”

Indeed, by most measures, a deep-sea hydrothermal vent site is about as hospitable to life as the dark side of the moon. The ocean is pitch black—no sunlight ever penetrates that deep—and the pressure is so intense it would crush a human’s lungs instantly. The water around the vents is, at turns, hotter than boiling and nearly freezing. The particles and fluid rising like smoke from the chimney-like rock formations are toxic to some species.

Yet despite these extreme conditions, many species, particularly invertebrates such as mussels, clams, crabs, shrimp, sea anemones and tubeworms, flourish there. They get all the nutrients they need from the superheated chemical soup spewing out of the vents.

"It’s like a fantasy world, a scene out of 20,000 Leagues Under the Sea," Van Dover says. "You want to share the experience with people. It seems too glorious to keep to yourself. It’s like being the first person to step on the moon. You want the whole world to experience it, too.”

In becoming a pilot and sharing her experiences as a researcher and deep sea explorer through her writing and teaching, that’s exactly what Van Dover hopes she’s done.

"Beyond what I call the travelogue appeal—the sheer beauty of these sites, and the amazing diversity of life that flourishes there—there is so much we can learn from a study of hydrothermal vents,” she says passionately.

The knowledge gained from studying the vent sites has benefits that extend far beyond the field of marine biology, she believes. By studying vents and the chemosynthetic ecosystems surrounding them, scientists have increased their knowledge of volcanic systems. They’ve learned more about how undersea ore deposits form, and how to find those deposits. Vent studies have yielded new information about extremeophiles—microorganisms that can adapt to high temperatures, high pressures and toxic environments, and which may have uses in industry, medicine and exploration.

"Our understanding of where life originated on Earth has been affected by our study of hydrothermal vents and deep-sea ecology,” she says. "It even helps guide how we look for life on other planets.”
Using the same expertise and enthusiasm she’s brought to deep sea exploration for more than 20 years, Van Dover is now charting a new course for the Marine Lab that builds on the lab’s strong foundation in marine biology and conservation, and expands its expertise in molecular biology and marine policy.

“I would like to see a modest faculty increase and new research facilities here on Pivers Island to accommodate modern molecular sciences,” she says. “The nation’s marine science and policy priorities are already moving in this direction, and it’s important that we stay at the front of the wave.”

She also aims to expand undergraduate opportunities to study marine sciences at the lab’s campus in Beaufort and on the Duke campus in Durham. Working with faculty, she’s developing a five-year plan to add more classes in marine biology for freshmen and sophomores on Duke’s main campus. She also sees “great value” in increasing the emphasis on hands-on learning and field research provided through courses like the Beaufort Signature Courses, which feature field trips for small groups of students to accompany a faculty expert on research trips to Trinidad, Hawaii, Singapore, Panama and elsewhere.

“The best way to learn is to be in the field, looking at animals in their natural habitat,” Van Dover says. “By increasing our students’ abilities to do that, and by increasing our faculty’s ability to do cutting-edge research, we are positioning the Marine Lab to remain at the forefront of policy, teaching and science for decades to come. The danger, I think, is in resting on our laurels. We have to find the edge and make sure we’re on it.”

Tim Lucas is the national media relations and marketing specialist for the Nicholas School and the Nicholas Institute.

As part of the Marine Lab’s new Beaufort Signature Course series, Cindy Van Dover will take students in Biology 207FL, Human-Coast Interactions in Brittany, to the coast of Brittany during fall break 2007. In this intensive field experience they will have a chance to learn about French maritime cultural heritage, regional and national coastal reserves (Le Parc naturel régional d’Armorique; Presqu’ile de Crozon), shellfish aquaculture (La Tremblade), seaweed harvest (Lanildut), and tidal energy (La Rance). For more on the Signature Courses, go to www.nicholas.duke.edu/marinelab/programs.
A Shark Ate My Homework?

“Sherman’s Lagoon” Cartoonist
Jim Toomey Shows his Serious Side
—Sometimes—as a DEL-MEM Student
Some people—the lucky ones—have moments of clarity that define their entire lives. Jim Toomey had his at age 12.

His dad, a former Navy pilot, flew a Cessna, and it was “kind of like the family station wagon,” recalls Toomey, who is just completing his first year in the Duke Environmental Leadership Master of Environmental Management (DEL-MEM) degree program.

“We were flying to the Bahamas for a vacation, and because Dad was flying the plane and we had no particular schedule, we could buzz around and check things out.”

Passing over a lagoon that was “beyond turquoise,” Toomey spotted the outlines of a shark. His dad dropped the plane to about 500 feet so everyone could get a closer look.

Everything about that moment plays into the 46-year-old Toomey’s life: his passion for oceans and their creatures, his reverence for family, his love of flying. Even more, it provided the basis for his internationally syndicated daily cartoon strip, “Sherman’s Lagoon.” Launched in 1991, the cartoon features Sherman, a happy-go-lucky great white shark who lives in a turquoise-blue lagoon with a cranky hermit crab, a bookish sea turtle and other assorted sidekicks.

The strip appears in more than 200 newspapers, including most recently the International Herald Tribune, and in 12 books, including In Shark Years I’m Dead (2006). Toomey counts “Peanuts” creator Charles Schultz and “The Far Side’s” Gary Larson as role models, and indeed, a comic strip in which sharks occasionally eat people sometimes reflects the influence of Larson’s mordant wit.

Although the strip doesn’t carry a heavy-handed environmental message—“you lose people if it’s too educational,” Toomey says—its settings and marine characters have introduced a battery of readers to the marine creatures that have fascinated Toomey since childhood.

Its fans include members of the Coral Reef Alliance, college professors who teach marine biology, and many staff members at the National Oceanographic and Atmospheric Administration (NOAA). Toomey has contributed artwork for educational posters distributed by NOAA, and, in 2000, he received an Environmental Hero Award from the organization “for using art and humor to conserve and protect our marine heritage,” according to the citation from Vice President Al Gore.

Sherman’s lagoon is on the fictional island of Kapupu, located near the real island nation of Palau, where Toomey’s father served as a Navy pilot during World War II. “It’s my homage to him,” says Toomey, who also is a licensed pilot.

It is his love of family that drove his decision to pursue a master’s degree at Duke. “When my first child was born four years ago,” he says, “I automatically became a stakeholder in the world that will exist after me. When it can be 65 degrees Fahrenheit in Durham, N.C., in December, what will it be like in 2035? Will my kids be facing malaria?”

Questions like this compelled Toomey, who lives with his wife and two children on the Chesapeake Bay, to consider a second career in environmental advocacy. Although he has volunteered for ocean-oriented nonprofits and kept well-informed about environmental matters while drawing “Sherman’s Lagoon,” he decided to solidify his credentials by pursuing a master’s degree.

Toomey was well aware that he would be an “oddball”—his term—in a degree program populated with professionals from organizations like the U.S. Environmental Protection Agency, Conservation International, Environmental Defense and Pfizer Pharmaceuticals. Before he applied for the DEL-MEM program, he talked to Norman L. Christensen Jr., Nicholas School founding dean and DEL executive director, about his qualifications and prospects. “I didn’t want to be just a cartoonist with a degree,” he says.

“Norm told me that we were going to need people who understand and can communicate about environmental issues on a longer timeline than four or six
years,” says Toomey, referring to the typical political term in office. Any concerns Toomey had about fitting in with students from more traditional backgrounds have been allayed, according to Christensen. “He has a different background from most students, but he has a lot of experience in the environment, particularly marine conservation, that is reflected in his volunteer work with various organizations and in his cartoons.”

Toomey, who uses a maximum of 30 words in each four-panel strip, has, not surprisingly, excelled at his written work in the DEL program. “He has a wonderful crispness and economy in his writing,” says Christensen. “Not a word or idea is wasted.”

In addition to courses on environmental management, land use policy, decision analysis and environmental economics, Toomey and his fellow students are getting an education from each other, not the least of which is learning about how different organizations work for the environment and developing a network. “We’ll all come out of here with a pretty deep Rolodex,” he says. “Our extended network includes classmates and professors, and it could lead to a job, a project, or a contract.”

Toomey is no stranger to Duke, having received a bachelor of science degree in mechanical engineering in 1983. He drew political cartoons for the Chronicle during his undergraduate career, honing his drawing skills and learning what makes people laugh. “You get instant feedback when you have lunch with your readers,” he says. He was a political cartoonist for a newspaper chain in Virginia before launching “Sherman’s Lagoon.”

Fans of “Sherman’s Lagoon”—like Christensen, who has lobbied local newspapers to pick up the strip—need not worry that Sherman will become extinct when Toomey finishes his degree in 2008. After 15 years of drawing it, he says, he is able to create a week’s worth of strips in a couple of days, leaving him enough time for a consulting job or a position with flexible hours.

Toomey is unsure at this point exactly what sort of second career will evolve from his time at Duke. In this regard, he is like other DEL-MEM students, says Christensen. “Most of them are poised for a change or for advancement with their current employers,” he says, although most of them don’t know exactly what form they want that change to take. “This program is ideally suited to help people like Jim answer that question.”

In Toomey’s case, the answer will almost certainly involve his superb communications skills. He is considering writing a syndicated column on environmental issues, making documentary films, or becoming a spokesperson for a corporation that is embracing environmental stewardship. With his background in engineering, the possibility of launching an entrepreneurial venture involving technology in aid of the marine environment also is in play.

He is anxious to get started. “We need to start the dialogue now,” he says. “I want to make the world better for my children.”

Lisa M. Dellwo is a freelance writer in Durham, N.C.

**DEL–MEM**

The Online Degree for Environmental Professionals

The Duke Environmental Leadership Master of Environmental Management degree is tailored for working professionals who want to upgrade their credentials. Coursework is conducted online, through conference calls, and through occasional brief visits to the Duke campus or Washington, D.C.

For more information, consult www.nicholas.duke.edu/del/del-mem or call (919) 613-8082.
Saying Goodbye to the Nicholas School’s Unsung Heroes
by William H. Schlesinger

Over the past six years, I have had the privilege to use this page to share my thoughts on the educational programs of the Nicholas School—forestry, geology, marine science, and human health—and on global problems, such as ozone depletion, excessive resource use, and continued, rapid human population growth. The Nicholas School has world-class research and education programs to address many of these issues, and we are proud to place our graduates in positions where they can work on them so effectively. My messages always have had a common denominator—to use the best science we know at the time to ensure a functional biosphere on this planet for tomorrow.

For this last column, I want to focus on some unsung heroes of the Nicholas School—the delightful staff that I have worked with during the past six years. Most of our recent alumni remember fondly Karen Kirchof and her assistants, Glenda Lee and Thelma Jernigan, for their wonderful help preparing them for the world of gainful employment. They are a terrific team and a real asset to the Nicholas School.

On the front end of Nicholas School enrollment is Cindy Peters, who with Joe Scarfo and Erika Lovelace, selects the best applicants to matriculate at the Nicholas School and guides their program of study with utmost care. The enrollment team, with its new efforts in recruitment across the country, has increased our class size from about 70 students in 2001 to 120 today. The MEM is the signature degree of the Nicholas School, and I am proud that so many great students have been able to join us under Cindy’s guidance.

To run the Nicholas School, we try to hire the best faculty and build the best facilities and programs for our students. That, of course, costs money. Money that drives the basic mission of research and education is the life-blood of any school, and I thank so many of our friends for their financial help during my term as dean. Their generosity has been nurtured by our development staff and the fine efforts of Peggy Glenn, Susan Berndt, and Krista Bofill.

Back in 2001, Molly Tamarkin was the first to welcome me to the Nicholas School, a full six minutes after the official announcement from the Provost. Molly and her staff guided our IT efforts for the first five years of my term, before she moved over to Arts and Sciences to do the same for their larger, more challenging program. Fortunately, I was able to recruit Susan Gerbeth-Jones, whom I knew from my earlier days in biology, to replace Molly and maintain the effective IT program we enjoy every day.

I’ve enjoyed many a late afternoon laugh with Jim Haggard as we have tried to manage the finances of the Nicholas School. Jim truly lives up to the motto that when he makes the dean look good, we all look good, and I am most thankful for his efforts to do so during my term. We’ve made great strides with the school’s finances, and Jim deserves a lot of credit for what we have accomplished. I hope he remembers my most repeated phrase: “Jim, the Sun will rise tomorrow over the Nicholas School.”

Scottee Cantrell and the communications “C” team have enjoyed a special level of my interest during the past six years. The C-team brought the Nicholas School to an unprecedented level of recognition on the Duke Campus, across the state, and around the nation, by promoting our most newsworthy stories to a well-cultivated list of media contacts and producing an award-winning Web site that is the envy of the other schools at Duke. Scottee has offered honest and thoughtful comments on the early drafts of many of my editorials, and with Tim Lucas, wrote the text for the New York Times advertorials that brought the school huge national attention. On top of all that, twice each year, Scottee pulls together a rich set of stories, news and features on the Nicholas School to produce this wonderful magazine, which she has made so much her own.

Laura Turcotte, Donna Sell, and more recently Anne Jones have been the inner staff of the dean’s office, where we have all shared many a light moment in the course of the ups and downs of daily life. It’s a little scary knowing what these folks know about me, and I have enjoyed their counsel on all subjects large and small.

There are many others I could mention, both in Durham and Beaufort, and as I leave the Nicholas School, I can’t help but think that no dean has ever had a more loyal, fun and productive team of coworkers. You have made the school run, and I will miss you all.

William H. Schlesinger is outgoing dean of the Nicholas School and James B. Duke Professor of Biogeochemistry.
In Print
Recent publications by Nicholas School faculty and staff

James S. Clark, H.L. Blomquist Professor of Biology
• “A Future for Models and Data in Ecology,” TRENDS in Ecology and Evolution, 2006 (lead author w/ A.E. Gelfand)
• “Elevated CO2 and Tree Fecundity: The Role of Tree Size, Interannual Variability, and Population Heterogeneity,” Global Change Biology, (coauthor w/ S.L. LaDeau)
• “Elements of Bayesian Inference,” Hierarchical Models of the Environment, Oxford University Press, 2006 (coauthor w/ A. Gelfand et al.)
• “Synthesizing Ecological Experiments and Observational Data with Hierarchical Bayes,” J.S. Clark and A. Gelfand (eds), Hierarchical Models of the Environment, Oxford University Press, 2006 (coauthor w/ A. Gelfand et al.)
• “Predicting Biodiversity Change: Outside the Climate Envelope. Beyond the Species-area Curve,” Ecology, 2006 (coauthor w/ I. Ibanez, M.C. Dietze, K. Feeley, M. Hersh, S. LaDeau, A. McBride, M. Wolosin et al.)

Larry B. Crowder, Stephen Toth Professor of Marine Biology
• “Effects of Stocking-up Freshwater Food Webs,” TRENDS in Ecology and Evolution, 2006 (coauthor)

Deborah Rigling Gallagher, visiting assistant professor

Nicholas W. Hayman, research associate
• “Shallow Crustal Fault Rocks from the Black Mountain Detachments, Death Valley, Calif..” Journal of Structural Geology, 2006 (author)

Robert B. Jackson, professor of environmental sciences and biology
• “Predicting the Temperature Dependence of Microbial Respiration in Soil: A Continental-scale Analysis,” Global Biogeochemical Cycles, 2006 (coauthor)
• “Functional Coordination Between Leaf Gas Exchange and Vulnerability to Xylem Cavitation in Temperate Forest Trees,” Plant, Cell and Environment, 2006 (coauthor)

Gabriel Katul, professor of hydrology and micrometeorology
• “The Relative Importance of Ejections and Sweeps to Momentum Transfer in the Atmospheric Boundary Layer,” Boundary-Layer Meteorology, 2006 (lead author w/ D. Poggi et al.)

Randall A. Kramer, professor of resource and environmental economics

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

Marie Lynn Miranda, associate research professor
• “Changes in Blood Lead Levels Associated With Use of Chloramines in Water Treatment Systems,” Environmental Health Perspectives, February 2007 (lead author w/ C.J. Paul, M.A. Overstreet Galeano et al.)
• “Incorporating a Built Environment Module into an Accelerated Second Degree Community Health Nursing Program,” Public Health Nursing, September/October 2006 (coauthor w/ J. Davis et al.)

A. Brad Murray, associate professor of geomorphology and coastal processes

Brian C. Murray, director for economic analysis, Nicholas Institute
• “Economic Consequences of Consideration of Permanence, Leakage and Additionality for Soil Carbon Sequestration Projects,” Climatic Change, January 2007 (lead author)
• “Methane and Nitrous Oxide Mitigation in Agriculture,” The Energy Journal, 2006 (coauthor) Special issue (eds: de la Chesnaye, F. and J. Weyant)

Jeffrey S. Pippen, research associate
Orrin H. Pilkey, James B. Duke Professor Emeritus of Geology


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


Daniel D. Richter, professor of soils and forest ecology

- "Bioavailability of Slowly Cycling Soil Phosphorus: Major Restructuring of Soil P Fractions Over Four Decades in an Aggrading Forest," Ecosystem Ecology, 2006 (lead author w/ J. Li et al.)

Raphael D. Sagarin, associate director for ocean and coastal policy, Nicholas Institute for Environmental Policy Solutions

- "Moving Beyond Assumptions to Understand Abundance Distribution Across the Ranges of Species," TRENDS in Ecology and Evolution, 2006 (lead author)

William H. Schlesinger, James B. Duke Professor of Biogeochemistry


Mario Siqueira, research associate


Martin D. Smith, assistant professor of environmental economics

- "Generating Value in Habitat-dependent Fisheries: The Importance of Fishery Management Institutions," Land Economics, February 2007 (author)

Cindy L. Van Dover, professor of marine biology, director, Duke University Marine Laboratory and chair, Division of Coastal Systems Science and Policy


Kyle S. Van Houtan, research associate


Jonathan B. Wiener, professor of law and professor of environmental policy

- "Better Regulation in Europe," Current Legal Problems, 2006 (author)

Grants

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

Paul A. Baker, professor of geochemistry, National Science Foundation, $279,980, "Reconstructing Past Climates of the Amazon Basin from the Isotopic Analysis of Tropical Trees"; NSF, $142,446, Collaborative Research: "Holocene Drought in the North American Interior."

Celia J. Bonaventura, professor of cell biology, National Institutes of Health, $151,690, "Functional Analysis of Engineered Hemoglobins."

Richard T. Di Giulio, professor of environmental toxicology, NIH, $183,015, "Toxicogenomics Core A"; NIH, $186,659, "Integrated Toxicology Program Training Grant."

The Society for Risk Analysis (SRA) announced the election of Jonathan B. Wiener, professor of law and of environmental policy, as its next president at the December 2006 annual meeting. Wiener serves as president-elect for 2007. His term as president for 2008 begins with the annual meeting in December of this year. The SRA is the professional society of experts in risk analysis whose focus on health, safety and environmental risks, addresses everything from pollution, traffic safety and disease to hurricanes, dam failures, global climate change and terrorism. SRA membership is about 2000 worldwide.

Memberships, Appointments and Awards

Richard G. Newell, Gendell Associate Professor of Energy and Environmental Economics, was awarded the 2006 Petry Research Prize for the Economics of Climate Change. Newell and co-recipient, William Pizer of Resources for the Future, were recognized for their paper "Discounting the Distant Future: How Much Do Uncertain Rates Increase Valuation?" published in the Journal of Environmental Economics and Management, July 2003. They are the first recipients of the prize, given by the Association of Environmental and Resource Economics (AERE). The award is sponsored by Glen Petry, professor emeritus of finance at Washington State University, to encourage and recognize international research on the economic consequences of greenhouse gases, and carries a $7,500 cash prize.

Research Associate Jeffrey S. Pippen received the Clarence F. Korstian Award for outstanding service to the Duke Forest. The award was presented at the fall Annual Duke Forest Gathering and Symposium celebrating its 75th anniversary.
David J. Erickson III, adjunct professor of computational biogeochemistry, National Aeronautics and Space Administration, $142,998, "Evaluating the Role of Global Snow Cover on Seasonal to Interannual Predictability of Temperature and Precipitation."

Patrick N. Halpin, Gabel Associate Professor of the Practice of Geospatial Analysis, David and Lucile Packard Foundation, $1,241,594, "Marine Ecosystem-based Management Tool Innovation Fund."


Robert B. Jackson, professor of environmental sciences and biology, Department of Energy, $1,791,082, "Southeastern Regional Center of the National Institute for Climate Change Research."


Emily M. Klein, Lee Hill Snowdon Professor Geology, NSF, $276,088, Collaborative Proposal: "Anatomy of an Overlapping Spreading Center: Geochemical and Geological Study of the EPR 903N OSG."


Marie Lynn Miranda, associate research professor, Association of State and Territorial Chronic Disease Program Directors, $950,000, "Building Geographic Information Systems (GIS) Capacity in Two State Health Departments to Address Heart Disease and Stroke"; National Center for Environmental Health; $266,890, "Childhood Lead Poisoning Prevention."


Brian Murray, director for economic analysis, Nicholas Institute, U.S. Environmental Protection Agency/Stratus Consulting Inc., $101,768, "Development of Offset Methodology for Afforestation and Reforestation Sequestration Projects"; USDA Forest Service, $108,525, "Economic Valuation of Payments for Ecosystem Services from Wetlands in the Lower Mississippi Valley, USA" (w/ R.A. Kramer)


Andrew J. Read, Rachel Carson Associate Professor of Marine Conservation, Geo-Marine Inc., $945,103, "Long-Term Monitoring of Protected Species in USWTR"; MCAS Cherry Point Environmental Affairs, $121,284, "Real-time Acoustic Monitoring of Bottlenose Dolphins in and Around the Brant Island Shoal Bombing Target (BT-9) and the Piney Island Bombing Range (BT-11)"; New England Aquarium, $94,010, "Reducing Conflicts Between Fisheries and Protected Species in North Carolina —Year 2."


Daniel Rittschof, associate professor of zoology, NC State University, $84,760, "Enhancing Artificial Reef Fish Populations by Providing a Nursery Refuge for Invertebrate Prey."

John W. Terborgh, James B. Duke Professor of Environmental Science, Blue Moon Fund, $115,000, "E-tools to Strengthen Protected Area Management in Latin America."

Avner Vengosh, associate professor, U.S. Department of Agriculture, $570,000, "An Integrative Investigation of the Sources and Effects of Groundwater Contamination for Local Communities."

— Compiled by Donna Sell, Nicholas School communications assistant
Jesse Marsh MEM’02 loves sushi, especially unagi—freshwater eel—and tekka makki, the classic preparation of raw tuna wrapped in sushi rice and nori. But these days, she orders California rolls and vegetarian rolls, especially the ones with tempura yam and avocado.

That’s because her favorite seafood generally comes from unsustainable fisheries.

Shrimp is pretty much out of the question, too, unless it is U.S. farmed or trawl-caught rather than the imported shrimp that prevails on restaurant menus and in supermarkets.

As the senior fisheries research analyst at the Monterey Bay Aquarium’s Seafood Watch program in California, Marsh not only makes informed choices about the seafood she consumes, but she helps concerned citizens throughout the country make similar choices.

The Seafood Watch program produces colorful wallet-sized seafood guides that tell consumers which fish to avoid, which are the best choices, and which are good alternatives. Behind these compact guides is a mountain of research analysis.

For each species, the Seafood Watch staff gathers information from academic papers, conference proceedings and government reports, and consults with experts on fisheries and aquaculture. This research is synthesized in a lengthy report that is reviewed by at least two external experts before being published online. The species is then classified as “Best Choice,” “Good Alternative” or “Avoid,” based on findings regarding the abundance of the species, its vulnerability to overfishing, the effects of fishing practices on the ecosystem, and other factors.

Marsh conducts a good deal of this research, along with two other staff members, and she also supervises some outside contractors employed by Seafood Watch.

She has spent the better part of a year revisiting the Aquarium’s recommendations about tuna. She checked the status of the world’s tuna fisheries by researching scientific and governmental reports and consulting fisheries experts. The results of her research will be reflected in the Seafood Guides published in 2007.

“The biggest change will be that many longline-caught tuna will go from ‘good alternative’ to ‘avoid,’” says Marsh. “That reflects our closer focus on the problem
of bycatch—of sea turtles, seabirds and sharks—in longline fisheries.”

Some fisheries, notably U.S. ones, have implemented measures to reduce bycatch, and “we acknowledge those efforts in our recommendations,” she says. But most international fisheries cannot demonstrate that they have solved the bycatch problem. That and the stock status of many tuna fisheries is why Marsh avoids sushi with tuna now—and urges us to do the same.

Blue Crabs and Sea Turtles, West Coast and East
Marsh’s interest in the marine environment comes naturally. She grew up in coastal New Hampshire, where her dad was a fisherman and her grandfather was an avid sailor.

Her love of the ocean and interest in the environment meshed during a “standout semester” when, as a Boston University undergraduate, she spent three months at the School for Field Studies in Baja, Mexico, studying the sustainability of a blue crab fishery there. Once a week, with three other students, she went into Magdalena Bay with local fishermen and measured their catches, helping to create a data set that would show whether the crustaceans were being overfished.

It was the first time the environmental science major was introduced to research that involved stakeholders in an environmental problem. “These people grew up fishing,” she says. “They were interested in learning how to continue working without depleting the crab populations.”

Ocean conservation became her passion, and the combination of science and policy offered by the Nicholas School was compelling, so Marsh came to North Carolina in 2000 to pursue a Master of Environmental Management degree at Duke.

With a focus on coastal environmental management, she spent a good deal of time at the Duke Marine Lab in Beaufort. “It is a really special place, unique,” she says. “The community there, from the maintenance crew to the women who worked in the offices to the professors was really strong.”

At the Marine Lab, sea turtle expert Larry Crowder presented her with an intriguing Masters Project prospect. Crowder, the Stephen Toth Professor of Marine Biology, is nationally recognized for his research into declining popula-
tions of sea turtles as a result of fisheries bycatch. But in the nearby Core Sound, fishermen considered the massive turtles to be pests, because they destroyed crab pots trying to get at the bait. That’s why local fisherman Joe Benevides had approached Crowder.

Benevides wanted to redesign the traditional crab pot to keep turtles out, and he asked Crowder for assistance in evaluating the new model. While Crowder was skeptical that anyone could turtle-proof a crab pot, he was intrigued.

“It was a karma thing,” he says. “Sea turtles are a protected species, but in this case they were a pest. If we are going to protect sea turtles from fishermen, we should protect the crab fishermen from them.” So he asked Marsh to help.

Her resume says, “Fished 90 experimental crab pots daily in Core Sound to determine changes in catch rate and turtle damage related to crab pot design.”

The reality was grittier. “For 30 days,” Crowder reports, “Jesse was out on the water at 6 a.m., working shoulder to shoulder with a commercial fisherman, shaking out pots and noting damage by turtles. A lot of students would be timid about going out with a fisherman and the hard work involved. She was totally into it.”

Traditional crab pots are 2-foot cubes made of coated chicken wire, “baited with stuff turtles like to eat,” according to Crowder. Benevides wanted to test a similar model with stouter wire and a second, low-profile or rectangular model, also with the stronger materials, that he thought the turtles would have a tougher time tipping over.

The low-profile pots did in fact show a greater survivorship rate, Marsh’s research indicated. But she and Crowder agree that, as those pots are more expensive than the traditional models, they will be slow to be adopted.

“The nice thing about her project is that it was not hypothetical; it was a real-world issue,” says Crowder. Two of Crowder’s students have since followed up by investigating the best placement of crab pots to avoid turtle damage. “Jesse opened that door for us,” he says.

More Sea Turtles and Back to the West Coast

After graduation, Marsh stayed at the Marine Lab to assist in an EPA-funded study of the sex ratios of different populations of sea turtles.
What’s Up with Chilean Sea Bass?

Chilean sea bass was the toothsome darling of chefs and seafood lovers in the 1990s. So popular was the buttery fish that world stocks were quickly overfished and it was threatened with extinction by the end of that decade.

Many restaurants and markets removed the fish—also known as Patagonian toothfish—from menus and displays, and along with other environmentally conscious consumers, I refused to purchase it from those restaurants and markets that continued to offer it.

So when a banner advertising Chilean sea bass appeared on the façade of the Whole Foods Market in Durham just days before my interview with Jesse Marsh MEM’02, I knew I had a good ice breaker for my conversation with the sustainable seafood analyst at the Monterey Bay Aquarium.

According to Marsh, one Chilean sea bass fishery in South Georgia, near Antarctica, has recently been certified as sustainable by the Marine Stewardship Council (MSC). Seafood that is certified by the MSC comes from a fishery with environmentally responsible practices, says Marsh. “Only a small portion of the sea bass that is available is certified,” she says. Most of the rest is caught illegally, with fisheries that ignore catch limits and that increase the mortality of albatross through bycatch.

“If you see Chilean sea bass on a restaurant menu, the chances of it being MSC-certified are slim to none,” she says. However, the fish from Whole Foods does indeed carry the blue MSC seal.

—Lisa M. Dellwo

Lisa M. Dellwo is a freelance writer in Durham, N.C.

web sites to note

Seafood Watch Program and printable pocket-sized Regional Seafood Guides, Monterey Bay Aquarium
www.seafoodwatch.org
Thinking of relocating and want insights into market trends, housing costs, and good schools for your children? Quickly need a few talking points on an unfamiliar issue? Traveling for work and hate to eat alone? Wonder what your classmates are doing? Look no further! The online Alumni Career Network is your resource.

What is it? A voluntary password-protected Web-based tool created by Career Services to be used by alumni as a professional network or expertise guide, and by current students seeking information about career fields, employment and internship opportunities, and masters project ideas.

Why participate in the Alumni Career Network? While alumni or current students may contact you for career advice, it also is a resource for faculty and staff to reach out to alums for academic or professional development and social events. Additionally, it is an excellent way for Career Services staff members to catch up with you during our travels.

Why update? The Alumni Career Network was upgraded recently, and we want to ensure that everyone has a chance to update and verify their information and participation.

How do I update my Alumni Career Network information? It only takes a few minutes to complete the two-step process.

Step 1: To update your career information or to volunteer for Nicholas School programs and activities, complete the Alumni Survey. Go to www.nicholas.duke.edu/career/allsurvey/.

Step 2: To make changes to your name, address, e-mail address(es), or employer information, you need to register with the Duke Online Alumni Directory. Go to www.alumniconnections.com/olc/pub/DUKE/register/register.cgi

Again, the updates are valid only after you complete steps 1 and 2.

In order to have a comprehensive and useful alumni database, we need you to participate. Your information could really make a huge professional or personal difference to a member of the Nicholas School family. Don’t delay. Do it today!
**Class Notes**

**David Leatherman MF’74**, retired entomologist from Colorado State University, is often invited to speak to community groups about his continuing studies on bark beetles and their impacts on forests.

**Wallace J. Nichols MEM’92** has taken a senior scientist position at The Ocean Conservancy. He will continue to collaborate with a range of research and conservation initiatives around the world, including as the principal investigator on the Duke University Project GloBAL bycatch assessment and as president of the International Sea Turtle Society for 2008. Keep an eye out for Nichols’ role in the upcoming documentary film about global warming, “11th Hour”, that is narrated and produced by actor and environmentalist Leonardo DiCaprio.

**Robert “Kim” Batchelder MF’93** has returned from the Yucatan Peninsula in Mexico where he worked for The Nature Conservancy. Kim is now a natural resources planner for Sonoma County Agricultural Preservation and Open Space District in California. The district is one of the top five farm-land and open space preservation programs in the nation and the first special district established for the purpose of protecting agricultural lands. It is one of the few jurisdictions in the nation to use a sales tax for the purchase of conservation easements to protect agricultural lands and preserve open space.

**C. Andrew “Andy” Keck MF’93** recently served as lead technical advisor on sustainable finance under a United States Agency for International Development (USAID)-funded assistance project in Madagascar. He provided assistance to the government in formulating a long-term environmental financing strategy, as well as a wide array of specific environmental financing mechanisms, such as trust funds, the Clean Development Mechanism, and natural resource user fees. Andy has been chief of party (Madagascar) for the International Resources Group in Washington, D.C., for 13 years focusing on international environmental management and sustainable development, and specializing in project management, sustainable finance, climate change, and environmental economics and policy.

**Chris Hale JD/MEM’00** is assistant attorney general for the Republic of Palau, an island nation in the Pacific Ocean some 500 miles east of the Philippines. Chris has been active in enforcing the Palauan law that makes commercial fishing for sharks and the practice of shark “finning” illegal throughout Palau’s territorial waters and its 200-mile exclusive economic zone.

**Jill Ozarski MPP’00/MEM’01** accepted the position of executive director for the Colorado Coalition of Land Trusts in Denver. CCLT’s primary focus is influencing public policy, increasing awareness of the importance of land conservation and ensuring land conservation excellence. Jill previously worked at The Wilderness Society in Denver.

After three years as a commercial program manager at the Consortium for Energy Efficiency in Boston (with fellow Duke alumnus **John Taylor MEM’02/MPP’01**), **Rachael Shwom MEM’01** entered Michigan State University’s Sociology PhD program in 2004. There she is an environmental science and policy fellow who conducts research on the dynamics of public support for climate change policies. She spent Fall 2006 in Washington, D.C., at the National Academies of Science, where she was a science and technology policy fellow for the Committee on Human Dimensions of Global Change. Rachael lives in Michigan with her husband, Nick Evelich, and their lab/husky mix, Sandy.

**Jennifer Atchley Vose MEM’02** and her husband, Wade, are pleased to announce the birth of their baby girl, Emily Kaytlin Vose, born Dec. II.

**Alexa Bach MEM’03** has moved to California to work at UrbanGreen in San Francisco. UrbanGreen partners with legacy land owners, institutions, communities and private developers to provide real estate development and advisory services for successful infill or greenfield development.

**Joel Dunn MEM’04, MPP’05** has had two major successes on Capitol Hill this year. First, the bill he helped write for Sen. Joseph Lieberman—the Long Island Sound Stewardship Act, which provides $100 million over four years for conservation—became a public law. And Congress established the Captain John Smith Chesapeake National Historic Trail in Chesapeake Bay. Joel has been working on this project for two years with Patrick Noonan, chairman emeritus of The Conservation Fund, a member of the Nicholas Institute’s Board of Advisors, and a past member of the Nicholas School Board of Visitors.

**Kim Maison MEM’06** has left the mainland to live in Hawaii and continue working for NOAA’s National Marine Fisheries Service as a sea turtle management specialist in the Pacific Islands Region. Kim is part of the service’s research, monitoring, conservation, assessment, and outreach efforts in waters around the Hawaiian Islands and the American Flag Territories.
Deaths

Richard W. Hartwell MEM'86, Nov. 3
James F. Kennek MF'47, Nov. 24
Larry R. Nelson MF'74, Aug. 26
Richard “Dick” Russell MF'63, Feb. 26
Craig D. Whitesell MF'54, June 20

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

“Having reached a mid-point in my career, I realized I was going to have to remake myself to compete in today’s marketplace. Duke’s Environmental Leadership Program has helped me retool for the next stage.”

Peter T. Masson
Duke Environmental Leadership Program Participant

Stay on Top of Your Field

The Duke Environmental Leadership (DEL) Program serves as the continuing education arm of the Nicholas School, providing unique opportunities for environmental professionals to hone their environmental management skills and stay on top of new developments in the field. Professional development opportunities are available through both our Continuing and Executive Education Program and the DEL-Master of Environmental Management (MEM) Degree Program.

Upcoming Short Courses

May 30-June 1
Environmental Developments on Capitol Hill: Sustainability Strategies for Businesses and Communities

July 23-26
Preparing and Documenting Environmental Impact Analyses

Continuing and Executive Education courses draw on the expertise of the Nicholas School and beyond, covering topics from environmental policy and legislation to land conservation, environmental communication to ecological risk assessment. DEL offers a Certificate in the National Environmental Policy Act (NEPA), co-sponsored by the Council on Environmental Quality, Executive Office of the President, for professionals seeking essential skills in the understanding and implementation of NEPA.

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, e-mail del@nicholas.duke.edu or call 919-613-8082.

Nicholas School alumni receive a 10 percent discount on all short courses.
By Laura Ertel

It helped Joel Dunn craft environmental legislation on Capitol Hill. Miranda Smith used it to cover expenses during her NatureServe internship last summer and to pay for travel to a coastal Geotools conference this spring. Terah Donovan found it helped her dedicate more time to her leadership roles at the Nicholas School.

Each of these Master of Environmental Management (MEM) students received a Nicholas School Alumni Fellowship—and each found it invaluable in making the most of their educational experience at Duke University.

The Nicholas School Alumni Fellowship Endowment Fund was established in 1987 by alumni and friends in conjunction with the 50th anniversary of Duke’s School of Forestry and Environmental Studies (which later was joined with the Duke Marine Lab and the geology department to become the Nicholas School). Brian Payne F’62, the Alumni Council president at the time, was the first contributor.

The fund is designed to provide fellowships to several graduate students in the Master of Environmental Management and Master of Forestry programs each year. The Alumni Council administers the program, reviewing applications, interviewing candidates and selecting the recipients. Students apply for the merit-based partial fellowships—three this year—in the spring of their first year.

Recipients are announced at the annual student spring banquet. Students can use the funds—generally up to $4,000—toward second-year tuition, to cover expenses related to attending school or toward a summer research project or study-related travel.

The Alumni Fellowship Endowment Fund also funds minority student fellowships for incoming students to help increase the diversity of the student body. Minority candidates include students of color, students with disabilities or students of nontraditional age.
“People often think they can’t make a difference if they can’t make a large gift, but this fund shows the power that many smaller gifts can make when added together,”

**Small gifts add up**

One of the most remarkable things about the Alumni Fellowship Endowment Fund, notes Deirdre Gordon, assistant director of development, is that it has been supported largely through small gifts from alumni and friends. Together, these gifts of $25, $50 or $100, have made a huge impact. Combined with several leadership gifts, these contributions have been invested by Duke, with the fund’s principal growing to more than $180,000 in June 2006.

“People often think they can’t make a difference if they can’t make a large gift, but this fund shows the power that many smaller gifts can make when added together,” says Gordon. “This combined generosity has resulted in a huge benefit to our students.”

**Leadership gifts provide boost**

Jim Miller, a 1970 Master of Forestry graduate, is one of the biggest supporters of the Alumni Fellowship Endowment Fund and has consistently made gifts to the fellowship since 1996.

A former Alumni Council president and recent retiree from the USDA Forest Service, Miller likes the idea that the fellowships are funded by previous students to help current students.

“I received a little help when I was in school, and I have the ability to give back, so it just seemed like the right thing to do,” he says.

He hopes that recipients of the fellowships will “put it to good use. Hopefully, it will be a benefit for the school, and a benefit for society,” he says.

**Much-needed financial assistance**

When he applied to the joint graduate programs at the Nicholas School and Duke’s Terry Sanford Institute of Public Policy, Joel Dunn MEM/MPP ’04 knew he couldn’t attend unless he got as much financial assistance as possible. He heard about the Alumni Fellowship and applied as soon as he could.

Receiving the fellowship, along with several others, made his Duke education possible.

“I’m really grateful to have received the award,” says Dunn, who graduated with Master of Environmental Management and
Master of Public Policy degrees. "It enabled me to spend more time on my educational pursuits and contributed to my enthusiasm for conservation leadership. It also bolstered my belief in myself, because someone else recognized my effort and my potential. The fellowship started me on a great career trajectory."

Dunn’s "trajectory" began as a Nicholas School student with a three-month fellowship in Sen. Joseph Lieberman’s office on Capitol Hill, where Dunn helped draft the Long Island Sound Stewardship Act, a $100 million initiative to protect ecologically valuable sites around the sound. The bill passed in the House and Senate and became law last fall. Dunn, the Chesapeake associate at The Conservation Fund in Arlington, Va., scored a second legislative coup last December when Congress passed a bill establishing the Captain John Smith Chesapeake National Historic Trail as part of the National Trails System. The 2,300 mile trail travels up almost every major tributary of the Chesapeake Bay and is the nation’s first all-water National Historic Trail. Dunn now coordinates the conservation, education and recreation strategies associated with the trail.

**Attending an important conference**

Second-year MEM student Miranda Smith has put her merit-based Alumni Fellowship to work to help finance her summer internship with NatureServe, a nonprofit conservation organization headquartered in Virginia, and for a trip to the National Oceanic and Atmospheric Administration (NOAA) Coastal Geotools 2007 conference in South Carolina this past March.

Designing her own internship over the summer and providing essentially “free work” to the nonprofit because she was able to take care of her own expenses through her Alumni and Doris Duke fellowships has led to a collaboration with the group to support her masters project. Her real-world project will involve analyzing confidential information from a draft Puerto Rican national land-use plan to determine resulting ecosystem changes.

In March, Smith traveled to the NOAA conference in South Carolina to present the research she did for NatureServe last summer.

"Attending this conference was more important to me than my masters project, honestly. It was a chance to present information to my peers and maybe my future employers about how ecologists and economists are thinking spatially about ecosystems and subsequently valuing them,” she says.

Smith received funding from NatureServe for the hotel and the Nicholas School’s Career Services office took care of the conference fee; the Alumni Fellowship helped pay for travel and expenses. “Having money to do this allowed me to network with spatial tool users and developers from all over the country. I also had the opportunity to attend a week’s worth of talks and workshops about the state of the art that I couldn’t have gotten anywhere else,” she says. “I am grateful and honored that the alumni were willing to help me.”

**More time to build relationships, experience**

For second-year MEM student Terah Donovan, the biggest value of the Alumni Fellowship has been freeing up her time. "Last year I worked 10 hours a week, but with the fellowship, I had the option not to work. That has allowed me to focus more time on my studies and on the leadership positions I have within the school, and to spend more time establishing relationships with classmates that hopefully will last beyond my years at Duke,” she says.
Donovan, who returned to graduate school after serving as a Peace Corps volunteer in Bolivia, is one of the older students at the Nicholas School. Having spent time out in the world before returning to academia, she believes that actively engaging in the community and developing leadership skills are as important for graduate students as classroom studies. She says, "The Alumni Fellowships provide an opportunity for students to look up from their studies and say: 'There's something else I can be doing here.'"

Donovan is the alumni relations representative on the Student Council and an organizer of the Forestry and Environmental Management Professional Social Group. She helped plan the September 2006 Hindsight is 20/20 conference, in which alumni returned to campus to share their experience with current students. She also is involved in the Working Group on Environment in Latin America.

After graduating this May, Donovan plans to go into consulting, with a long-term goal of working in international conservation. "The fellowship has allowed me to interact more with alumni. Talking with them has helped me voice what I want to do and think more about my career trajectory," she says.

Revitalizing the Alumni Fellowship
This year's Alumni Council, led by President Amy Schick Kenney BS'96, MEM'98, is launching an awareness and fundraising effort to increase the principal in the Alumni Fellowship Endowment Fund so additional awards can be made in the future.

"It has been many years since the council has actively raised funds for the Alumni Fellowship Endowment, so many Nicholas School alumni may not even be aware that it exists," says Kenney. "Contributing to this fellowship is a wonderful way for those of us who have benefited from a Nicholas School education to assist current students in pursuing their education. The recipients of our merit-based fellowships are incredible students who have really taken advantage of their education, so it is nice to honor them and recognize their efforts."

This summer, alumni of the Nicholas School and its predecessors will receive a letter encouraging them to contribute to the Alumni Fellowship Endowment Fund. The Alumni Council's goal is to increase the endowment to provide several additional or more substantial merit-based fellowships as well as fellowships for minority students.

What makes contributions to the Alumni Fellowship Endowment Fund different is the permanency of the gifts, says Kenney. The fund is a pooled endowment, meaning that all gifts to the fund will be permanent resources for the fellowships.

"Adding fellowships will increase funding opportunities for students, including those who might not otherwise have the resources to attend the Nicholas School, and will help foster a diverse student population at the school," Kenney notes. "Even a small gift makes a huge difference for a student. We would love to be able to provide many more fellowships, and hopefully this fundraising effort will enable us to do that."

To find out more or to contribute to the Nicholas School Alumni Fellowship Endowment Fund, contact Deirdre Gordon at 919-613-8019 or deirdre.gordon@duke.edu.

Laura Ertel is a freelance writer based in Durham, N.C.
ConocoPhillips, the third-largest integrated energy company in the United States, and MeadWestvaco Corp., a global packaging company with operations in 29 countries, each have pledged $1 million to support the Climate Change Policy Partnership (CCPP), an industry-university collaboration that is working to develop policies to address the problems of global climate change.

The CCPP is a four-year initiative that was launched last year by Duke University and Duke Energy to pool the expertise of the university’s Nicholas Institute for Environmental Policy Solutions, Nicholas School of the Environment and Earth Sciences, and Center on Global Change with other concerned partners in the corporate and academic worlds.

The partnership’s mission is to provide unbiased data and analyses on climate change to government, corporate and environmental leaders.

ConocoPhillips’ pledge will support research and policy analysis on a range of issues relating to transportation fuels and the economics of limiting carbon pollution, said Robert A. Ridge, vice president of health, safety and environment at Houston-based ConocoPhillips.

MeadWestvaco’s pledge will support research and policy analysis on a range of critical issues relating to the impact of climate change on forest resources.

“MeadWestvaco has long believed in sustainable business practices and is committed to learning and sharpening our own strategies for addressing climate change,” said Mark T. Watkins, vice president of technology and forestry at MeadWestvaco. “Our goal is to make a meaningful, positive impact through our actions as a leading global packaging company as well as influence broader climate change policies.”

Tim Profeta, director of the Nicholas Institute said, ”ConocoPhillips and MeadWestvaco share a common conviction with Duke and its other CCPP partners that the purpose of the CCPP must be to apply, not merely accrue, knowledge. Providing decision makers with factual, timely counsel, free of political spin, is critical.”

The CCPP will expand its focus as it adds new partners from the nation’s agricultural and financial services industries.

“We are eager for other partners to join us in this endeavor,” said Robert B. Jackson, director of Duke’s Center on Global Change. “A viable policy to address global climate change must encourage reduced carbon emissions from, and adaptation by, all sources and segments of the economy, not just a few.”
save the date

Mark your calendar for the following dates and monitor our Web site at www.nicholas.duke.edu for additional events.

4/20/07
April 20
Duke University Earth Day Festival
Bryan Center Plaza, Durham
Contact: Deb Wojcik
919-613-8700 or deb.wojcik@duke.edu

4/20
Nicholas Institute Board of Advisors Meeting
Sanford Institute for Public Policy, Durham
Contact: Sue Harris
919-613-8731 or susanna.harris@duke.edu

4/20–21/07
April 20–21
Nicholas School Board of Visitors Meeting
Washington Duke Inn & Golf Club, Durham
Contact: Michele Wittman
919-613-8003 or mwittman@duke.edu

4/26–27/07
April 26–27
MP Symposium
CEM candidate master presentations
Duke Marine Lab, Beaufort
Contact: Lauren Stulgis
252-504-7531 or lauren.stulgis@duke.edu

4/27–28/07
April 27–28
The Nicholas Experience Weekend
Annual Fund donor event
Duke Marine Lab, Beaufort
Contact: Michele Wittman
919-613-8003 or mwittman@duke.edu

5/11/07
May 11
MP Symposium
Duke Environmental Leadership-MEM candidate master presentations
Levine Science Research Center, Duke University West Campus
Contact: Sara Ashenburg
919-613-8063 or sea3@duke.edu

5/22–25/07
May 22–25
American Geophysical Union 2007 Joint Assembly
Acapulco, Mexico
Contact: AGU
1-800-966-2481, ext. 333 or ja-help@agu.org

8/5–10/07
Aug. 5–10
ESA/SER (Ecological Society of America/Society of Ecological Restoration)
Joint Annual Meeting
San Jose McEnery Convention Center
San Jose, Calif.
Contact: Devon Rothschild
202-833-8773 x 218 or devon@esa.org

10/26/07
Oct. 26 (Tentative)
Parents Reception
Nicholas School Parents Weekend event
Levine Science Research Center
Contact: Michele Wittman
919-613-8003 or mwittman@duke.edu
Nicholas Talks

Throughout the year the Nicholas School and the Nicholas Institute provide a wealth of information to faculty, staff, students and the general public through visiting lectures and through talks by the school's faculty members. You, too, can listen to selected lectures by going to Nicholas Talks at www.nicholas.duke.edu/nicholastalks.

Dan Hikuroa
flattened forests, moa tracks and more: environmental collapse from New Zealand volcanoes

Richard Ostfeld
the function of biodiversity in zoonotic disease risk

Josh Donlan
fisheries bycatch, invasive species, and the business of making seabirds

Stuart Pimm
biodiversity, peoples, deforestation, and oil