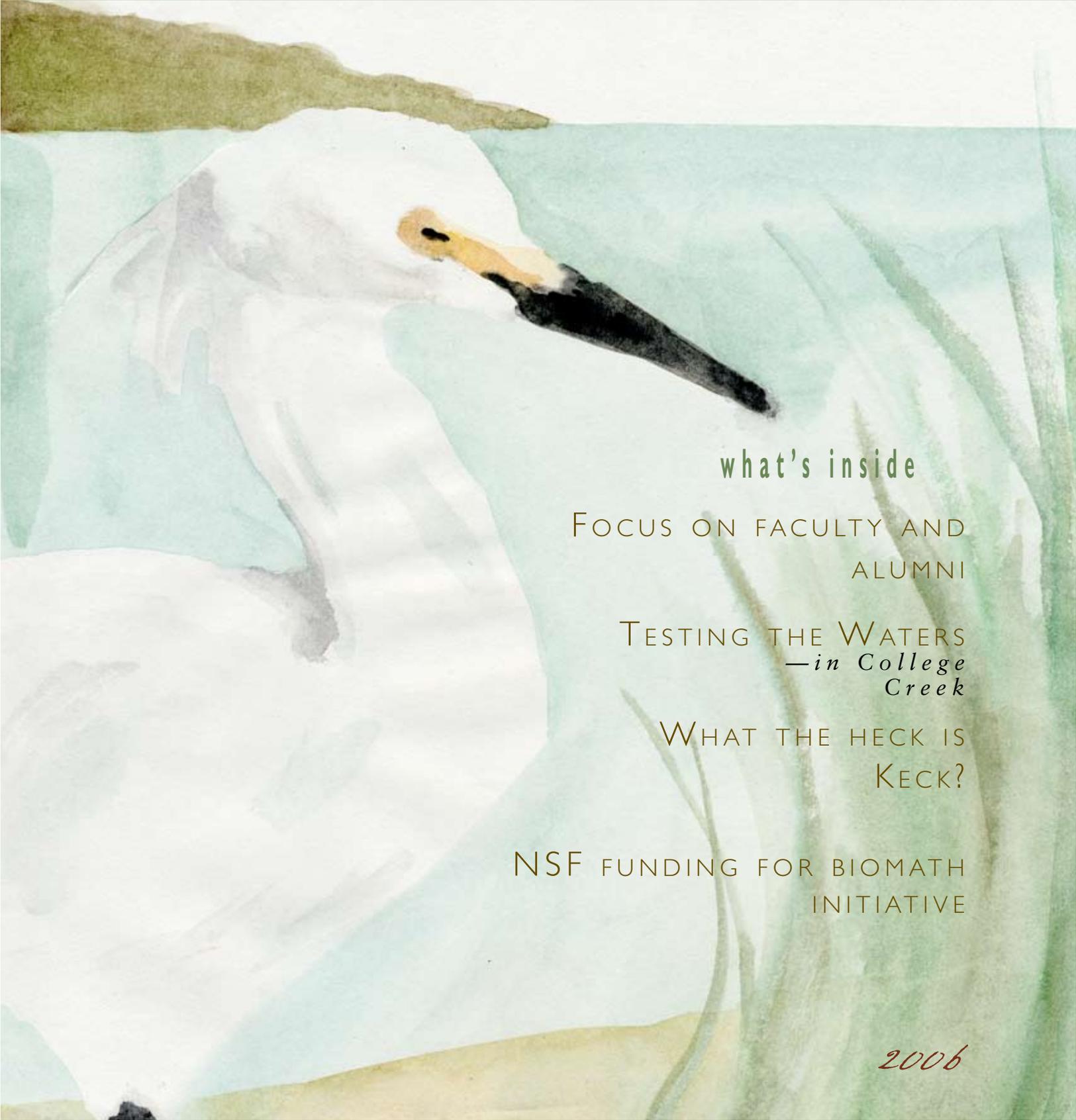


downstream

A NEWSLETTER FOR FRIENDS OF WILLIAM & MARY AND THE ENVIRONMENT



what's inside

FOCUS ON FACULTY AND
ALUMNI

TESTING THE WATERS
*—in College
Creek*

WHAT THE HECK IS
KECK?

NSF FUNDING FOR BIOMATH
INITIATIVE

2006



Testing the waters in College Creek *or—it's not just a landmark, it's a watershed*

“
A
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survey respondents did
not even know that their
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James City County were
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Bay watershed.”

Water runs under the bridge at Crim Dell, then where does it go? And what's in that water, anyway? These are questions often posed by students, faculty and staff at William & Mary and also the sorts of water-quality questions asked by homeowners throughout the College Creek watershed—the local drainage basin for the College and surrounding land in Williamsburg and James City County.

Until recently, no one has known what's in the water in local streams, lakes and tidal creeks that drain into College Creek. In 2004, as part of a summer research program at the W.M. Keck Environmental Field Laboratory, a group of students assumed responsibility for monitoring water quality in local waterways. They created the College Creek Alliance to promote watershed stewardship and education through the collective actions of people in the community and at the College.

With Keck Lab director Dr. Randy Chambers, the students collect and analyze water samples from 23 locations around the 14 square-mile

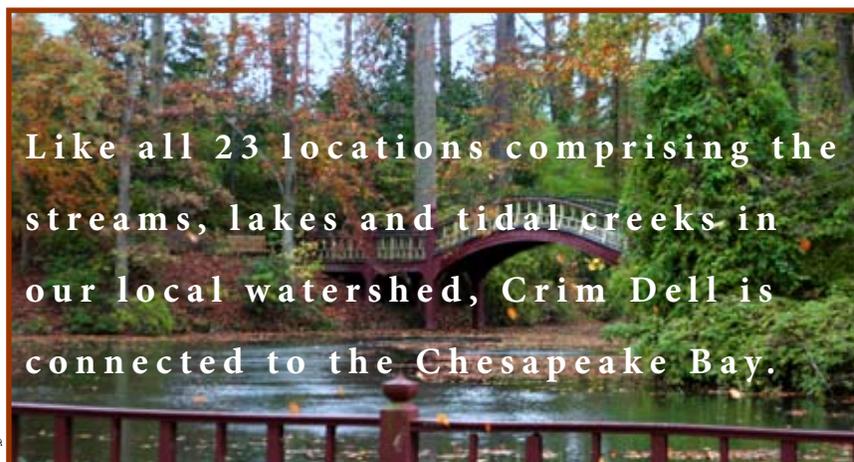
measured low levels of dissolved oxygen (the reason why the College installed bubblers at the bottom of Crim Dell to oxygenate the water), and high levels of dissolved nutrients (likely a consequence of fertilizer runoff from campus lawns). On some sampling dates, fecal coliform levels have been above state-mandated standards to permit reasonable public use of the water (swimming and fishing).

Crim Dell water flows downstream through campus and into Lake Matoaka. In turn, lake water spills over the dam on Jamestown Road and into College Creek, which empties into the James River, and finally into the Chesapeake Bay. So like all 23 locations comprising the streams, lakes and tidal creeks in our local watershed, Crim Dell is connected to the Bay.

Declining water quality in the Chesapeake Bay is a downstream reflection of what is delivered from upstream, but how many people make the connection between watershed land use and the health of the Bay? To address this issue, College Creek Alliance (CCA) students designed a survey of local perceptions of water quality. Parents of middle school students completed the survey and the results were somewhat surprising. A majority of over 200 survey respondents did not even know that their homes in Williamsburg/James City County were part of the Chesapeake Bay watershed.

This disturbing result highlights the need for more community-based environmental education to help residents understand the potential impacts of their local actions on the region. In coming years, the College Creek Alliance will continue monitoring local water quality and develop community-based initiatives to involve both students and townspeople in promoting watershed education.

—by Randy Chambers



Staff Photo

watershed. They measure temperature, pH, dissolved oxygen, dissolved solids, turbidity, nutrient concentrations and fecal coliform levels. The collections are completed four times a year to track seasonal variations and to detect hotspots for poor water quality.

So what really is in that water running under the Crim Dell bridge? The students have

For more information visit the CCA web site:
www.wm.edu/environment/CCA/CCA.html

WHAT THE HECK IS KECK?

Environmental research at the Keck Lab

ON THE SHORES OF LAKE MATOAKA, NESTLED 'NEATH THE TREES, SITS THE KECK ENVIRONMENTAL FIELD LABORATORY,

which opened its doors in 2001 to environmental education and research at William & Mary. For the past five summers, the facility has been the center of operations for a host of student research projects funded by the Mellon Foundation, the Charles Center, the Virginia Environmental Endowment and by former BOV member Clifford Schroeder.

Most projects, however, have been funded by an REU grant from the National Science Foundation. REU is short for “Research Experiences for Undergraduates”, and there are hundreds of REU sites throughout the United States, all with a different research focus. Each summer, eight students from undergraduate schools across the country join up with students and faculty members from the College of William & Mary to conduct interdisciplinary studies of local watersheds.

Faculty involved in watershed research include Randy Chambers, John Swaddle, Dan Cristol and Stewart Ware (biology), Greg Hancock (geology), Timmons Roberts (sociology) and Robert Hicks (economics). Student teams tackle many fundamental issues in watershed impacts and protection in developed areas, such as the changes in animal communities in altered aquatic and terrestrial environments, and the effectiveness of retention ponds in managing stormwater. Because what local watersheds look like and how they function is the result of historical changes in land use, students use sociologic and economic examinations of environmental protection and water and property rights.

“The research program provides training in interdisciplinary cooperation that is essential for resolving complex environmental issues,” says Professor Hancock. “Our students work together to identify opportunities for successful watershed management.”

William & Mary student Emily Thompson completed her watershed project last year studying the potential impacts of non-native turtles living in Lake Matoaka. She notes, “REU sparked my interest and became a crucial stepping stone toward my goal of a Ph.D. and ultimately a career in ecological research.”

The program attracts students from large universities including Yale, Stanford, and University of Southern California, but also from small colleges like Middlebury, Williams, Lewis and Clark, Beloit, Sewanee and Gustavus Adolphus. Throughout the 10-week program, students live and work together and, in the process, build bridges across academic institutions and areas of environmental study.

Student response indicates that the watershed research program at William & Mary is highly successful. A student from Whitman College summed up her experience this way: “As cheesy as it may sound, the program changed my life—I loved everyone and the experience I gained has helped me feel more confident about my abilities as an undergrad research student.”

—by Randy Chambers

“As cheesy as it sounds, the program changed my life—I loved everyone and the experience I gained has helped me feel more confident about my abilities as an undergrad research student.”



Keck Lab

Staff Photo



Joe McClain

REU students persuade a photojournalist from Channel 3, the CBS affiliate in Norfolk, to venture into the waters of Matoaka to video what they are doing.



The world is my laboratory



rowing up in Bulgaria, behind the Iron Curtain, I had the unusual privilege to meet young people from far-flung countries like Cuba, Vietnam,

Kazakhstan, German and many others. As a university professor, my mother invited her students to our home regularly, an experience that redefined my notion of community. Arriving in the United States at the age of 19 as an undergraduate student at Mount Holyoke College, I



formed friendships with people from around the world who became my family. Local lost its meaning as a concept—I could relate to events across the globe with equal emotional intensity because those events inevitably touched the life of people I could relate to.

Political borders always struck me as artificial divisions given the interconnectedness of our global environment. Finding a way to transcend these boundaries has become my passion. And devising collaborative international solutions to global environmental problems has come to preoccupy my mind and heart.

My passion for the environment arose through political science. A comparison of U.S. and European public policies revealed significant differences in preferences for regulation and tolerance for governmental initiative. Why did European countries embrace the notion of a welfare state? Why was the United States adopting an isolationist stance in many international contexts? Surprisingly, many interesting answers came from—water.

Water bodies in Europe are connectors, a life system of communication among peoples and countries whose fates are intertwined. For the United States two oceans provide natural geographic barriers encouraging isolationism. My desire to unearth the root causes behind social preferences and practices became a quest for understanding how countries developed environmental policies nationally and how they interacted with their peers internationally.

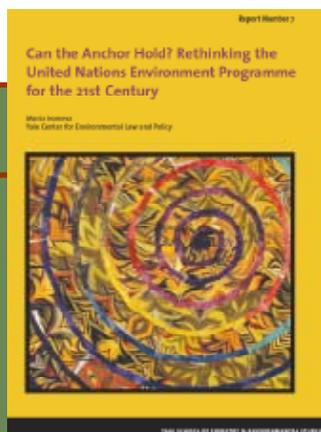
As a graduate student, I launched a project on global environmental governance at the Yale Center for Environmental Law & Policy to strengthen environmental policymaking on a global scale. Climate change, ocean pollution, fisheries depletion are all problems that require collective international action. Yet, the system for dealing with these challenges is fragmented, lacking in authority, and poor in resources. Over a dozen United Nations agencies have

some environmental responsibilities, yet little progress is evident at the global level. Why has the international system failed to successfully resolve international environmental problems? How can it be reformed to become more effective and deliver more equitable results? These questions informed my Ph.D. studies at Yale and will continue to inform my teaching at William & Mary.

Focusing on the big picture, I will work with the most precious quality students bring to the classroom—the ambition and idealism to change the world. During the fall 2005 semester, my senior seminar on international organizations and environmental governance developed a performance assessment framework for international organizations. How can we evaluate the effectiveness of the United Nations Food Programme, the Convention on Biological Diversity, or the International Monetary Fund? What factors account for the performance of these organizations? This analysis will be expanded in subsequent courses to create a solid methodology and rigorous analytical framework that could be effectively employed in the policy world.

In the classroom I seek to create knowledge by bridging theory and practice and challenging students to answer real world questions and to think creatively to change the policies that govern our global environment.

—by Maria Ivanova



Maria Ivanova launched a project on global environmental governance while at Yale. In her landmark report, *Can the Anchor Hold? Rethinking the United Nations Environmental Programme for the 21st Century*, she and her group made seven recommendations for making the U.N.'s environmental governance and programming more effective.

- Assess global environmental governance
- Create an information clearinghouse
- Create a capacity clearinghouse
- Cluster institutions to combine efforts of agencies
- Initiate a strategic review of UNEP
- Consolidate financial accounting and reporting
- Restructure UNEP's organizational governance

A walk in the woods, *priceless*

I GREW UP IN MAINE, CONSTANTLY EXPLORING THE WOODS AND WATERS AROUND MY HOME.

Staying in New England, I attended Middlebury College in Vermont, where I had the privilege to learn geology in one of the best natural classrooms in the U.S. Graduate work took me to Cornell University where I earned both my M.S. and Ph.D. in geochemistry. I have used geochemical methods to examine the high temperature processes that formed ancient volcanic rocks from West Africa and Vermont, and the low temperature processes that bring dissolved materials to the surface through hot springs in Nepal. Geochemistry is a powerful tool in the geologist's toolbox, and I remain amazed at what we can learn from simple chemical analyses.

At William & Mary, my courses will expose students to the underlying principles and theories behind geochemistry (the dreaded thermodynamics) but more importantly how we use geochemistry as a means to understand Earth processes. I will teach a variety of geochemistry-based courses, which will examine everything from the origins of rock and mineral composition to the biogeochemical interactions between the lithosphere, hydrosphere and biosphere. I plan to continue research on the sources and fates of solutes in rivers, focusing on our local James River and York River watersheds, as well as expanding my studies to examine the river/ocean boundary in the Chesapeake estuary.

I have spent a great deal of my life in places where you can "get away from it all" and for a moment feel a part of nature. To walk in the woods and not hear a highway or to look at the moon shining on a Himalayan peak and not have the stars washed out by city lights are remarkable experiences. Beyond the more practical health and sustainability environmental issues we all face, it is important to me that similar opportunities to "get away" exist for future generations.

—by Matt Evans



“To walk in the woods and not hear a highway or to look at the moon shining on a Himalayan peak and not have the stars washed out by city lights are remarkable experiences.”

DONOR GIVING OPPORTUNITIES FOR ENST

- **Keck Environmental Field Lab Expansion**
Faculty offices, grad student office, research/teaching lab, GIS lab. Naming opportunity for new wing.
- **Endowed faculty line for environmental program**
- **Named postdoctoral scholars program and named speaker series**
- **Equipment fund** (*new equipment, service contracts, repairs, replacements*)
- **Named faculty research grants**
- **Service learning/community-based environmental research workshop**
- **Named permanent local environmental internships**
- **K-12 school environmental education outreach program**
- **Van/minibus and smaller field vehicle—**
high mpg or green fuel vehicle, if possible
- **Named student awards**
- **Endowed student research scholarship**
- **Annual field trips**
- **Boathouse/storage shed for Keck Lab**



AN ALUMNA GIVES BACK

*The art and science
of empowerment*

M

y motivation to attend William & Mary can be summed up in an image: a short, balding man with a dry sense of humor and a passion for all things feathered—Dr. Mitchell Byrd. His mentorship became one of the many benefits garnered in my four years at W&M.

a species-by-species basis, my focus addressed the human actions driving environmental deterioration.

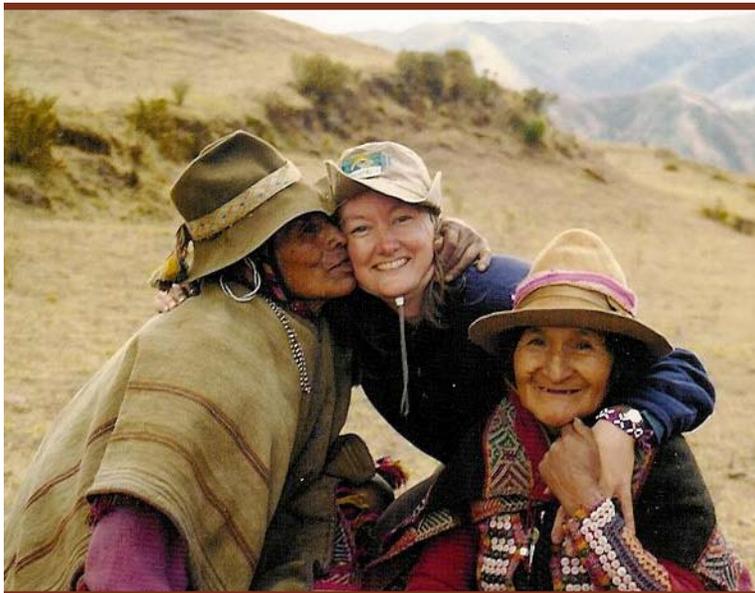
In 1993, I left the Smithsonian for Stanford University, to investigate and develop conservation plans to address a number of factors leading to the rapid decline of amphibian populations. Throughout the course of my Ph.D. work, I honed my skills in leadership development, communications, conflict resolution and other strategies to better understand and influence the human values, beliefs and actions driving environmental change. Upon completing my doctorate, I studied and was certified in Neuro-linguistic Programming (NLP) and returned to Washington, D.C., where I was a senior scientist and international policy wonk for the State Department, National Invasive Species Council and The Global Invasive Species Programme.

I realized that if we are to conserve biodiversity for future generations, we must look at environmental conservation as an art and science of motivating and empowering people. This realization inspired me to establish Ecos Systems Institute (ESI; www.ecos-systems.org) in 2003, a training company that builds the capacity of individuals and organizations dedicated to environmental conservation and sustainable development.

Attending W&M was one of the best decisions I made in my career. For that reason, it is important to me to give back to the College. I can best accomplish this by supporting students who have a passion for environmental issues, particularly those students who are eager to gain real world expertise as a complement to academic instruction.

This past summer ESI piloted a program to place such students in internships with conservation-oriented organizations in Washington, D.C. Four highly-motivated women applied and were placed at the National Council for Science and the Environment, The Environics Foundation, African Wildlife Foundation and Greenpeace.

—by *Jamie K. Reaser, Ph.D. '90*



Jamie Reaser with Q'ero Indians in the Peruvian Andes.

Jamie's ESI pilot program matches W&M women with a passion for the environment to relevant organizations. One of these women was Natalia Wood, whose story appears at the left.

WHAT I DID ON MY SUMMER VACATION

This past summer I worked at the African Wildlife Foundation, a conservation NGO. Most of the staff is in Africa—the Washington, D.C., office houses fund-raising and program development. The big focus of the organization is conservation implemented from four perspectives: landscape conservation, species research (which focuses on how to better manage the relationship between animals and people living in one area), leadership training and education and enterprise (AWF works with tribes to set up environmentally sustainable economies).

My job over the summer was to revise Wild Lives, a field guide sent out in gift packs to tourists going on safari with companies that partner with AWF. The guide is to remind tourists to keep conservation in mind as they vacation.—Natalia Wood

Jamie Reaser put Natalia in touch with the African Wildlife Foundation. W&M networking at its finest.

At that time, the College did not have an environmental science program, so I designed an interdisciplinary major, field biology (biology, anthropology and geology), and further pursued my love for nature with a minor in studio art, focusing on biological illustration. When not studying, I joined organizations designed to address environmental issues on campus and beyond. The Biology Club, Recycling Club and Outdoors Club were well attended and quite vocal when it came to conservation issues. Collectively these organizations established the Campus Conservation Coalition (CCC) to raise awareness of the environmental challenges facing the College.

My post-graduate career began as a field biologist working for the state's endangered species program. I then traveled to Belize to study neotropical migratory birds at Manomet Bird Observatory.

At the Smithsonian, I assisted in the establishment of the Smithsonian Migratory Bird Center, which led to my study of the human dimensions of conservation. Instead of evaluating the consequences of environmental problems on

D. GABRIEL KAUPER '05

Sustainability & Agriculture

It's not your ordinary college seminar

My name is D. Gabriel Kauper. In 2003, I co-founded the W&M Farmers and Gardeners Club for the purpose of forming a community of botany, nature and food enthusiasts to work regularly at local farms and pool our interests for other projects. We spent Saturdays working (and eating) with farmer Charlie Maloney at Dayspring Organic Farm, located about 40 miles northwest of W&M. After speaking with Mr. Maloney and Professor Timmons Roberts, I decided to intern at Dayspring Farm in the summer of 2004 to experience and research sustainable agriculture. Mr. Maloney runs a CSA—community supported agriculture—in which subscribers invest in the farmer for a future weekly share of the growing season's produce. I participated in everything from seed to sale: transplanting, plant identification, ensuring proper growing conditions, soil development, composting, learning about beneficial plants and insects, harvesting, going to market. You name it, I did it. A grant from the Mellon Foundation supported further research on modern and sustainable agriculture, botany and native Virginia plants, soil conservation, agricultural movements, deep ecology and sustainable business models.

The summer's work gained momentum. By fall, I crystallized the summer's research into an environmental studies senior seminar—Sustainability and Agriculture—that Professor Roberts, Mr. Maloney and I taught that spring. Included in the seminar were field trips to farms, intensive class discussions and final projects that emphasized creativity and practicality. Readings addressed topics such as genetically modified organisms (GMOs), the lives of farmers, soil fertility, marketing organics, agribusiness and global trade issues, green business, the future of natural resource use, and the utility vs. beauty of the natural world. Authors included Wendell Berry, Paul Hawken, Wes Jackson, Gene Logsdon, Bill McDonough, Steve Lerner, Vandana Shiva and Alan AtKisson. We also shared a potluck or two.

The class rocked. It avoided abstraction by grounding students in farm work. It promoted self-reflection and sincerity by asking questions that challenged the sustainability of our own personal histories, habits and aspirations: "How did this come about?"; "Is this sustainable?"; "How could we make it so?" Final projects demonstrated a rich and interdisciplinary flavor: organic and eco-marketing, genetic labeling and global trade, backyard chickens, wild edibles, public land use issues and intentional communities. And the seminar is back by popular demand; the spring 2006 course is filled.

—by Gabriel Kauper '05

“The class rocked. It avoided abstraction by grounding students in farm work. It promoted self-reflection and sincerity by asking questions that challenged the sustainability of our own personal histories, habits and aspirations...”



Staff Photos

Organic farmer, Charlie Maloney, cultivates student interest in all aspects of sustainable agriculture.



YOU DO THE BIOMATH *to protect the environment*

Dan Cristol, John Swaddle and Randy Chambers in biology and Sebastian Schreiber, Tim Killingback and Junping Shi in mathematics were awarded a five-year grant from the National Science Foundation to mentor students at the intersection between their disciplines—biology and mathematics. Using current, local environmental problems and the broader issues of habitat loss and fragmentation, students will focus on ecological and evolutionary modeling approaches. Currently, there is a national shortage of students with training in biomath.

Our students are tackling large scale environmental issues. Jake Wamsley '06 is collaborating with researchers at VIMS to investigate how fragmentation of habitat quality (eel grass beds) changes the viability of animal (amphipod) populations. Evan Saltzman '08 is taking this modeling a step farther by examining how fragmentation of habitats occupied by a predator and prey species can drive evolutionary diversification in prey species. Evan's work may have implications for understanding the maintenance and origination of biodiversity. Sean Koebly '08 and Ravi Jefferson-George '07 spent the summer gathering data on birds living

near the mercury-contaminated Shenandoah River, and are going to model the impacts of the mercury on the Shenandoah Valley's bird populations. With each semester new students will join the program to tackle new ecological questions using the potent combination of biology and mathematics.

During the summer, we mentor Thomas Nelson Community College students in environmental research. This past summer, Rachel Biondillo (recently transferred from TNCC to W&M, class of '07) analyzed how local land cover and broad ranging geographic features influence the breeding success and fitness of eastern bluebirds. Another TNCC student, Tondra Robinson, investigated and modeled how food quality from the environment influences bird health. Tondra found that dramatic size disparities between siblings in a nest can be partly explained by differences in the abilities

of birds to extract precious resources from their food, namely nitrogen and phosphorus.

Faculty in this program are not just overseeing student research, they are also offering new courses. Last spring, Schreiber and Swaddle co-taught a new course called Metapopulation Ecology and Evolution—a growing field that

During the summer, students from Thomas Nelson Community College examined bluebird habitat and created models that will help scientists better manage bird populations.

Nick Kalish



studies how semi-isolated populations (i.e., a metapopulation) can persist and be conserved in increasingly fragmented landscapes.

—by John Swaddle

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