



The Pace Center's "Class Matters" Event on Environmental Justice Sparks Lively Debate

By Barclay Satterfield, PEI STEP Fellow

NIMBY—Not In My Back Yard—is an expression environmentalists around the globe are familiar with. It begs the question “If not mine, then whose?”—and generally results in heated debate. The provocatively titled PEI-sponsored event, *In Whose Backyard? A Conversation about Environmental Justice at Home and Abroad*, was, not surprisingly, impassioned and dynamic. Held in February and produced by Greening Princeton* and the Pace Center as part of Pace's “Class Matters” event series, the panelist-led program became a disturbing discussion on how environmental ills are often forced upon disadvantaged people. Originally slated to last an hour in McCosh 60, the program continued for nearly two, with the audience of students, faculty, and townspeople staying on to ask questions.

The program panelists included George Hawkins '83, PEI visiting professor and executive director of New Jersey Future; Olga Pomar, an attorney for South Jersey Legal Services (SJLS) in Camden, New Jersey; and Patrick Hossay, associate professor of political science at Richard Stockton College of New Jersey.

Hawkins opened the discussion with an overview of environmental justice issues and reported a correlation between the location of polluting industrial facilities and the race and income of area residents. Affluent people have the resources and power to keep factories “elsewhere,” he said, suggesting that those who live near big polluters most likely lack the power and resources to cope with the resulting pollution.

This correlation can be found in the realm of industrial waste disposal as well, he said, pointing out that hazardous waste generated in New Jersey is often

shipped out for disposal in less affluent southern states. Environmental injustice also occurs in the standards set for Superfund site clean-ups, Hawkins said. Affluent communities often have higher standards than other areas, he reported, and the funds needed to meet those higher standards drain money away from clean-up projects located in less-affluent communities.



Environmental Justice panelists George Hawkins (left), Patrick Hossay, and Olga Pomar.

Pomar, who works on community development and environmental justice issues that include enforcement, drinking water, and Superfund clean-up, supported Hawkins' assertions with a specific example of Superfund administration. She reported that when radioactive contamination was discovered in a warehouse in Camden in the 1980's, it was 11 years before Superfund money was allocated to the problem. And even then, most of the funding went to clean up a similar site in white and affluent Gloucester County.

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Little was left for largely minority, economically disadvantaged Camden, home to 114 known contaminated sites and a large sewage treatment plant. In addition to these problems, Camden suffers from air pollution and heavy metals contamination.

Hossay, who teaches courses on environmental policy and international relations and development, and whose work addresses environmental problems from a human well-being perspective, took the discussion to the international arena. He asserted that the word ‘backyard’ must now extend to the entire world because environmental problems caused locally often have global consequences and in turn, global consequences affect us locally.

Hossay pointed to global warming. The U.S. is currently the largest emitter of greenhouse gases, Hossay reported, and yet our government has yet to take significant action to address global warming, citing concerns for the U.S. economy and the “injustice” of treaties that do not force third-world countries

The panelist-led program became a disturbing discussion on how environmental ills are often forced upon disadvantaged people.

to reduce emissions as well. Meanwhile, the likely consequences of global warming—changes in weather patterns and severe weather events—are predicted to do the most damage in developing regions where populations rely on subsistence farming and are ill-equipped to handle natural disasters. Hossay reported that, over the next 10 years, there will be an estimated 50-million environmental refugees in Africa alone.

On a different issue, Hossay asserted that environmentalists—typically white, affluent, and suburban—tend to concern themselves with wildlife protection and deforestation in developing countries without regard for the people living in those countries. The most rapid deforestation, he said, occurs in areas with the greatest wealth disparity. He pointed to the difficulty of enforcing anti-poaching laws when a single poached parrot can fetch \$100 in a region where people make \$200 per year.

**[Editor’s note: Greening Princeton is an organization of undergraduate and graduate students who work with Princeton University administrators to improve environmental sustainability practices on campus.]*

Janet Gruschow

A Bittersweet Recognition of a PEI Director

By Simon Levin, George M. Moffett Professor of Biology, Professor of Ecology and Evolutionary Biology, Founding Director of PEI, 1993-1998

In the fall of 1997, PEI was still in its infancy. It had secured core funding and appointed its first faculty, but it was clear that the next five to ten years would determine whether it would realize its potential as a major force for environmental education and research within the Princeton community, and more broadly, at the national and international levels. Everyone recognized the importance of carefully selecting faculty and leaders to build Princeton’s reputation and of expanding PEI’s reach to all sectors of the University. All of these things worked out well indeed, and PEI has become all that we hoped for and more. But one, seemingly less obvious element that became the key to PEI’s success, was relegated to a short footnote in the Fall 1997 Newsletter:

“PEI welcomes Janet Gruschow as Executive Director... Janet joins the Institute from her previous position as acting Department Manager in Romance Languages and Literatures. Prior to this, Janet was the acting Coordinator for the Council on Science and Technology... Janet worked for many years as a Senior Program Associate for the Science and Human Rights Program of the AAAS in Washington, D.C...”

When one looks back on one’s tenure in any job, successes and failures stand out clearly. Nothing in my time as Director, however, topped the decision to hire Janet, who became key to PEI’s growth. As I interviewed candidates with François Morel, who was to become the next PEI Director, we couldn’t believe our good luck when Janet became available. Still, she exceeded all expectations, helping steer PEI on a steady course of growth in size and accomplishments. She became, in every sense, the Associate



Janet Gruschow

Director, a title that she assumed in 2005, but that had best described her activities for nearly a decade before.

Not only the directors, but the entire community with whom she interacted, trusted Janet's fairness, admired her skills, and counted on her judgment. Janet had a vision for PEI that resonated with that of the faculty, and indeed helped shape PEI. She worked closely and enthusiastically with students, with faculty, with the outside community, and with donors, to whom she was able to articulate PEI's goals and importance. She was active on the Princeton Environmental Oversight Committee, which helped translate PEI's goals into campus practice. She was a strong presence as well on the Princeton Environmental Reform Committee, which had similar objectives, and worked to develop funding from the New Jersey Higher Education Partnership for Sustainability (NJHEPS) for an update of the 1995 PERC Environmental Audit. No one was better at putting

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PEI's growth within its historical framework, relating it to a set of broader principles, and helping to keep it on track. Her broad experience and training (she holds an M.A. in economics from the Johns Hopkins University School of International Studies, a Diplôme de Langue and Certificat de Français Parlé from the Alliance Française, Paris) made her perfect for PEI, and she redefined the job.

Janet helped lead PEI with insight, tireless energy, and dedication, never pausing even at the expense of her own good health. She was the smiling face of PEI to a large community for nearly a decade, making it hard to keep her a secret, especially to President Tilghman. So now Janet has moved on to new challenges as assistant to the President, where she will shine brighter still. I am delighted that she has been recognized for her performance, and pleased that PEI gave her a vehicle to show her remarkable talents. I am happy also that the University will benefit from her skills. It is always good to have friends in high places, and Janet will always be a part of PEI.

Population Ecologist Tackles Global Environmental Issues

Andrew Dobson, professor of ecology and evolutionary biology (EEB), and a member of PEI's associated faculty, is an expert in the fields of population ecology of infectious diseases and conservation of endangered and threatened species. In addition, he is one of the select members of the U.S. academic community at the forefront of an enormous international effort called The Convention on Biological Diversity (CBD).

Dobson co-authored "The Convention on Biological Diversity's 2010 Target," an article published in the January 14, 2005 issue of *Science*.^{*} The article states that significantly reducing the current rate of biodiversity loss by the 2010 target date will "involve developing models to see how the human, biological, physical and chemical components of the earth system interact.... Given the contributions that biodiversity makes toward alleviating poverty, it is crucial that indicators and models address all components."

PEI News spoke to Dobson about his research on infectious disease in Africa and his work for the CBD.



Professor Andrew Dobson

Research in Africa

PEI: Please describe your current research in Africa.

AD: The problems I am currently studying deal with how infectious diseases affect whole communities of animals. The questions we ask are: What happens when species share infectious diseases? How many diseases are in a food web? How much of biodiversity is actually parasitic on another species? The effort stems from a huge need to know more about the role of parasites and diseases in the natural environment. Most species interact with parasitic creatures their whole lives, each charismatic animal and plant is really just a patch of resources for a whole community of parasitic species. Ultimately these species may be

the major threads that hold food webs together. We won't understand how nature works until we know how infectious diseases and parasitism work at the population and community levels.

PEI: Why is Africa an ideal place for you to conduct your research?

AD: Africa, specifically the Serengeti in Tanzania, is an ideal place to do research because economic studies have been conducted there for nearly 50 years. [This gives us an] historic perspective on how the Serengeti changes through time. More specifically, we can look at the role of diseases in this system and examine their interactions with their hosts to determine what's driving outbreaks or more chronic persistence. The

For the four-fifths of the world who live close to poverty, there is a major human well-being component to the study of biodiversity.

whole of what you see in the Serengeti today has been massively shaped by diseases. Particularly, it's the result of the rinderpest pandemic which occurred 100 years ago.

That pandemic began in Africa when infected cattle were accidentally introduced in the 1890's. Rinderpest then spread from the cattle through the whole of sub-Saharan Africa, killing grazing species such as wildebeest and buffalo. This resulted in reduced food for carnivores. The reduction in grazing species affected the plants, because, naturally, plants increase if nothing is eating them, and this also increased fire frequency. Thorny shrubby bushes were replaced by grasslands. Everything we see today on the Serengeti is still recovering from this pandemic.

PEI: How does your knowledge of the rinderpest pandemic apply to current problems?

AD: The study of such a pandemic and the lessons to be learned from it crosses over into modern scourges as well. As an example, the effects of the rinderpest pandemic in Africa provide many reasons why we need to be much more prepared than we currently are for the Asian bird flu. The U.S. government's response to Hurricane Katrina scares me the most, because it suggests that the U.S. government does not take environmental warnings seriously.

The Convention on Biological Diversity

The Convention on Biological Diversity (CBD) originated at the 1992 Rio Summit on Biological Diversity and set as its goals the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources. The CBD was adopted by 190 countries. The U.S. did not participate.

At the 2002 World's Park Congress in Johannesburg, South Africa, CBD participants proposed a major challenge to the world's scientific and environmental communities: "To achieve, by 2010, a significant reduction of the current rate of biodiversity loss at the global, regional, and national level as a contribution to poverty alleviation and to the benefit of all life on earth."

The CBD and its goals have since been endorsed by the World Summit on Sustainable Development. The World Summit on Sustainable Development explicitly recognizes the parallel between the millennium development goal of significantly reducing global poverty by 2015 and the key role that biodiversity plays in sustaining the lives of most of the world's poorest people.

PEI: What is your role with the CBD?

AD: The CBD proposed that there needed to be a means to observe changes in biodiversity because so many of the world's poor are dependent upon natural resources for survival. For the four-fifths of the world who live close to poverty, there is a major human well-being component to the study of biodiversity. To this end, in July 1994, I co-chaired a meeting in London called "Beyond Extinction Rates." This meeting brought together a small committee of conservation scientists in order to create workshops and working groups to develop methods for monitoring rates of loss of biodiversity and to increase the perception in the media that there is a significant economic and health cost associated with these losses.

As co-chairs, Professor Georgina Mace of the Institute of Zoology, London, John Robinson, director of Wildlife Conservation International [the research arm of the New York Zoological Society], and I are currently trying to get scientists to look at protocols to see how this monitoring is being accomplished. The bits are there. We must find the gaps and make sure [the monitoring] is being done in a way that is scientifically rigorous.

**Editor's note: [Balmford, A., et al.]*

2005 Colvin Awards

Funding Field Research Along the Jersey Coast and Southwestern Utah

Last May, undergraduates Madeline Renny and Alexander Nees were co-recipients of the 2005 Becky Colvin Memorial Award. The award, established in 1995, is a grant that supports environmental field research projects for the senior thesis. The fund was established and is supported by Dr. and Mrs. Robert Colvin in memory of their daughter. Becky Colvin '95 was an Ecology and Environmental Biology (EEB) major who was committed to field ecology and environmental studies. What follows are profiles of the co-recipients and their field projects.

Madeline Renny

Colvin Winner's Research Assists Terrapin Conservation Project

Madeline Renny, a senior majoring in EEB, applied her 2005 Colvin prize funds to understanding the movements and habitats of the northern diamondback terrapin (turtle) as part of the Terrapin Conservation Project conducted by the Stone Harbor, New Jersey-based Wetlands Institute. To support her senior thesis, she began an internship at the Institute last July and studied terrapins in the salt marshes near Stone Harbor in an effort to improve future conservation efforts relating to this species.

According to Renny, diamondback terrapins (*Malaclemys terrapin terrapin*) have been threatened by a variety of human activities for over a century. Most significant, perhaps, is the loss of nesting habitats stemming from residential development in shore communities along the New Jersey coastline. Because females seek to lay their eggs above high-tide lines, their only nesting habitat is often embankments adjacent to coastal salt marshes, and consequently often located near roads. During the late May through July nesting season, when female terrapins leave the marshes to look for habitat, many are killed or maimed by motor vehicles. The high rate of terrapin deaths in shore communities can also be attributed to commercial crab traps, even though by law the traps

are required to have terrapin excluder devices.

Renny's independent research, using Colvin funds and conducted with the guidance of her thesis advisor, Professor Rosemary Grant of the EEB department, investigated how terrapins use salt marsh ponds—a habitat previously unknown to contain terrapins and one that had never before been studied. Through trapping experiments, Renny examined nine different ponds and determined that terrapins inhabit ponds of varying size, shape, and depth. She found that many of the terrapins in the ponds were large, adult females. The females, she says, are especially vital to sustaining the terrapin population.



Renny uses a hand-held microchip scanner to see if this terrapin was one that was previously captured and microchipped by the Wetlands Institute.

According to Renny, her findings emphasize the need to implement conservation strategies that include the protection of pond habitats.

Renny used the institute's sonic telemetry system to study terrapin movements in the local marsh creeks.

Transponders were attached to the shells of 20 terrapins whose movements were then able to be detected by receivers placed throughout the creeks. Renny's research revealed that female terrapins have unique movement patterns in which creeks are utilized as pathways. Tidal flow and time of day also play a role in terrapin movement which may be further affected by human activity in and along the creeks.

As to the success of her investigation, Renny is circumspect, "Since this is preliminary data and these studies will continue for several years, it is difficult to make any conclusive statements. However, my research has uncovered a new terrapin habitat [ponds], and my findings have helped the Institute devise improved research plans for this coming summer and future years. It has been a very rewarding experience."

The diamondback terrapin conservation effort began in 1989 as a joint project of the Wetlands Institute and the Richard Stockton College of New Jersey.

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—Madeline Renny

Work on this project takes place during summer months and is conducted by undergraduates from colleges and universities throughout the U.S. and Asia, and by local volunteers.

Like Renny, each student intern at the Wetlands Institute conducts individual research. Students along with local volunteers are on round-the-clock road



Madeline Renny holds a terrapin captured in one of the salt marsh pond trapping experiments.

patrol to help get the turtles off the roads and take freshly killed ones to the lab where their eggs are harvested and incubated. The hatchlings are reared in the lab for a year or two and, once grown, are microchipped for future identification before release into local salt marshes.

Founded in 1969, the Wetlands Institute is a private, non-profit organization. Its mission is "to promote appreciation of the vital role wetlands and coastal ecosystems play in the survival of life on this planet." For more information visit www.wetlandsinstitute.org.

Alexander Nees

Getting to the Root of the Tamarisk Problem in the Southwest

EEB major Alex Nees knows firsthand how human activity has profoundly changed the ecosystem of the Colorado River in southwestern Utah and is working to reverse some of those changes. A co-recipient of PEI's 2005 Colvin prize, Nees applied his grant to a pioneering study of "invasive" tamarisk trees that have largely replaced "native" willow and cottonwood forests in tributaries that drain into the Colorado River. Restoring cottonwood and willow forests is important, he says, as it has become the rarest type of forest in the U.S.

Nees arrived in the southwest intending to examine select vegetation along the Colorado and track its response to changing salinity levels. He believed the river would show a concentration gradient sufficient enough to effect the vegetation, but it did not. Consequently, he changed the focus of his research, and chose instead to analyze a number of sites on six tributaries of the Colorado: Dirty Devil River, Fremont River, Price River, San Raphael River, Muddy Creek and Trachyte Creek. Using Colvin funds, Nees conducted his field work independently over much of last summer.

At each of 12 study sites, Nees measured tamarisk abundance, cottonwood abundance, water temperature and salinity, and took soil samples from three locations within each site. "I analyzed each soil sample for the salinity and for its textural classification [percentage sand/silt/clay]. I also used flow mea-

"As beautiful as the tamarisk is, it is now a major environmental problem." —Alex Nees

surements that are publicly available through the U.S. Geological Survey (USGS). USGS maintains automated stream-flow monitoring stations all around the country, so I had access to daily flow measurements going back 80 years in some cases," explains Nees.

While the Colorado River has always been naturally salty, Nees observes, its salinity has been affected by dams. Dams make the river colder and, potentially, saltier, he says. More salt-tolerant than native cottonwoods, tamarisks have been able to flourish in this environment while the cottonwoods are failing in it.

Tamarisks, also known as salt cedars, usually grow as dense collections of woody shrubs or small trees in

areas where water is near the surface. They use more water than native vegetation and as a result, reduce the total flow of the river. Lower total flow means less water is collected in reservoirs which, in turn, means less water is available for human uses including irrigation, power generation, and municipal needs. Water shortage further results in higher prices for the water that is available. The reduced flow and its subsequent effects lead to erosion and further degradation of land and water habitat.

“As beautiful as the tamarisk is,” says Nees, “it is now a major environmental problem.”

Nees, whose advisor is PEI Interim Director and EEB professor Stephen Pacala, believes his senior thesis will help find a feasible solution to the problem of tamarisks along the rivers of the southwest. Based



Vegetation on the Trachyte Creek in Utah. In the photo on the left, tamarisks thrive. The photo on the right shows that few cottonwoods remain.

on an analysis of data from both his fieldwork and work in the labs at Princeton, Nees’s thesis presents an index by which one can predict tamarisk abundance in a given location using the salinity of the soil and its textural characteristics (i.e., sand/silt/clay percentages), flow regime patterns, and physical distance from the Colorado. Nees’ index will help set restoration goals, since it can be used to calculate how to change salinity flow pattern/silt content via management to create tamarisk-unfriendly habitats, he says.

“Following my work, further research is needed to determine the precise effect that water flow has on the salinity of the soil and its structure. Only then can active

management recommendations be made,” he says.

According to Nees, the tamarisk problem in the southwest can be traced back to a Californian who, around 1850, first imported the attractive ornamental species from Asia to plant near his ranch. Nearly 50 years later, in 1896, George Adair, founder of Adairville, Utah, planted tamarisk around his house on the Paria River and from there it spread. As Alex elaborates, “Initially the tamarisk spread from the plantings into the irrigation channels, because it could take advantage of their (obviously) unnatural flow patterns. That was a pretty limited problem (after all, the channels aren’t very valuable wildlife habitats regardless of what the vegetation looks like), but the channels served as a reserve population for the tamarisk, and once the big dams were constructed along



the Colorado, starting with the Hoover Dam in 1928, the plant spread into the disrupted ecosystems of the riparian corridors.”

Nees plans to conduct more fieldwork in the western U.S. after graduation and has applied for a fellowship from the San Francisco-based Compton Foundation to support his pursuit of an independent, self-directed program to restore the ecology of a 540-acre property in New Mexico. The property, which includes the cottonwood/willow riparian habitat, serves as the classroom/base camp facility of the Cottonwood Gulch Foundation, a non-profit outdoor education foundation that Nees has been involved in for almost a decade.

Following this fieldwork, Nees plans to pursue a Ph.D. in plant ecology in order to teach and perform research at the university level.

PEI to Sponsor Summer Programs for Local Teachers

July 2006 marks the fifth year PEI will sponsor professional development programs in science for middle and elementary school



Teachers attending the CEBIC Summer Institute last year, in Professor Bocarsly's chemistry lab.

teachers from Princeton and surrounding communities. One program, QUEST (Questioning Underlies Effective Science Teaching), is designed to enrich teachers' content knowledge

and inquiry pedagogy skills. The PEI/QUEST program is coordinated through the University's Program in Teacher Preparation. More information on QUEST can

be found through the website www.princeton.edu/teacher.

One of PEI's research centers, the Center for Environmental Bioinorganic Chemistry (CEBIC), will host the CEBIC Summer Institute, a two-week program for middle school teachers. Program offerings include "The World Ocean" taught by **Danielle Schmitt**, geosciences undergraduate lab manager, and "Chemistry and the Senses" will be taught by **Andrew Bocarsly**, professor of chemistry. The CEBIC website is www.princeton.edu/%7Ecebic/

In addition, the Cooperative Institute for Climate Science (CICS), another research center within PEI, will sponsor a program for elementary teachers, grades 3-6. The program, "Weather & Climate," is headed by **Dr. Steven Carson**, formerly of the Geophysical Fluid

Dynamics Lab. The CICS website is <http://web.princeton.edu/sites/cics/>

PEI Talks to Educators at the NSTA Annual Meeting

Environmental fieldwork and collaboration was the focus of a talk presented by **Dr. Eileen Zerba**, PEI's environmental studies program (ENV) instructor and director of undergraduate laboratories, and **Anne Catena**, PEI Outreach Coordinator, at the annual meeting of the National Science Teachers Association this spring.

Zerba and Catena spoke to an audience of university and K-12 teachers. This talk was given as an outreach initiative of CEBIC. The meeting was held in Anaheim California in April. For more details, visit <http://www.princeton.edu/%7Ecebic/outreach.html>



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