



Undergraduate students survey insect populations with Professor Brian Farrell on the Boston Harbor Islands. Read more about undergraduate summer research funding on page 4.

## Center Welcomes Diverse Second Cohort of Environmental Fellows

From Sri Lankan tree frogs and Australian algae to the grasslands of East Africa, the research topics of the next group of Environmental Fellows vividly represent their diverse backgrounds. Five Fellows from five different countries will begin their work this September, joining the remaining five Fellows from the program's inaugural group. (Two of the first seven Fellows, Peter Huybers and Valeriy Ivanov, left the program early for faculty positions at Harvard and the University of Michigan, respectively.)

*Gil Bohrer* will be the first John and Elaine French Environmental Fellow. Gil is an atmospheric physicist who focuses on atmosphere-biosphere-hydrosphere interactions. He will receive his Ph.D. in civil and environmental engineering in June 2007 from Duke University. As an Environmental Fellow, Gil will work with Paul Moorcroft of the Department of Organismic and Evolutionary Biology on biosphere-atmosphere interactions around forest gaps and edges. He is particularly interested in using computer models to understand how small-scale forest discontinuities affect forests at large scales, especially in regard to the exchanges of water, energy, and carbon dioxide that represent the life function of forests.

*Rebecca Case* will be one of three Ziff Environmental Fellows in this second group. Rebecca is a microbial ecologist studying the effects of bacterial-algal interactions on the marine sulfur cycle, and on

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climate change more broadly. She received her Ph.D. in microbial ecology in January 2007 from the University of New South Wales in Australia. As part of her doctoral work, Rebecca isolated the bacterium, *Ruegeria* R11, a novel bacterial pathogen of algae whose virulence is temperature dependent. Her finding suggests that algae may be susceptible to a similar impact from rising ocean temperatures via global warming as is seen in corals. As an Environmental Fellow, Rebecca will work with Roberto Kolter of the Harvard Medical School to continue her research on bacterial-algal interactions and unravel the role of this type of interaction in the release of the climate regulating compound dimethyl sulfide from algae.

*Garth Heutel* will be the first Environmental Fellow funded by the Kernan Brothers endowment. Garth is an economist who studies the dynamic – and sometimes counterintuitive – interactions between environmental policies and economic issues. As a graduate student at the University of Texas, Garth examined the effect of the Clean Air Act (CAA) on electric utilities executives' decisions to invest in new technologies. Because the CAA grandfathers old plants, utilities are less likely to scrap these plants and replace them with newer ones. These provisions may increase the use of older, dirtier power plants and thus increase emissions, significantly impacting environmental quality. As an Environmental Fellow, Garth will work with Richard Zeckhauser of the Kennedy School of Government to examine other cases of grandfathering in environmental policies, such as the New Source Review policy of the Clean Air Act and the Corporate Average Fuel Economy standards for new automobiles. He plans to develop a dynamic model of consumer choice of automobiles in the presence of these policies and estimate the model to evaluate the impact of policy changes.

*Madhava Meegaskumbura*, another Ziff Environmental Fellow, is an evolutionary biologist focusing on understanding species extinction and how best to construct conservation strategies for endangered species

in biodiversity hotspots. Originally from Sri Lanka, Madhava worked for several years with the Wildlife Heritage Trust organization in that country before entering graduate school at Boston University. He earned a Ph.D. in biology in May 2007. At the center of Madhava's doctoral field research was his astonishing discovery of nearly 100 previously undescribed species of tree frogs – about 2% of the global total of frog species. As an Environmental Fellow, Madhava will work with James Hanken, Professor of Biology and Director of Harvard's Museum of Comparative Zoology. Madhava will continue his research on tree frogs in an effort to identify correlates of threat and extinction and to develop strategies to predict and prevent future species extinctions.

*Esther Mwangi* will be a Ziff Environmental Fellow and will also receive funding through the Giorgio Ruffolo Sustainability Science Fellowship at the Kennedy School of Government. Esther is a political scientist originally from Kenya whose broad research interests concern the role of institutions (particularly property rights) in fostering sustainable natural resource management and improving local livelihoods. Her research also addresses issues of gender, land rights, and the politics of policy making in natural resources and conservation. Esther earned a Ph.D. in public policy from Indiana University in 2003. Her dissertation examined the ecological and livelihood impacts of changing property rights arrangements in the Maasai rangelands of East Africa. She most recently was a postdoctoral fellow with the International Food Policy Research Institute, and has also worked with Oxfam and the Kenya Wildlife Service. As an Environmental Fellow, she will work with William Clark of the Kennedy School of Government. She plans to use multiple methods – including survey research, in-depth interviews, and remote sensing – to extend her analysis of the interactions between property rights transformation, rangeland management, and livelihoods in semi-arid pastoral systems, with a focus on East Africa.

More information on all of the Environmental Fellows and their research can be found on the Center's website, [www.environment.harvard.edu](http://www.environment.harvard.edu).

## Center Awards Nine "Seed Grants" for Innovative Faculty Research

This spring the Center for the Environment announced that it would make nine seed grants to faculty members for innovative environmental research. The awards seed projects with an environmental focus that represent a new research direction for faculty candidates. This year the Center received 19 proposals from across

campus requesting nearly \$600,000, making the selection process very competitive.

*Michael Aziz* (Gordon McKay Professor of Materials Science, School of Engineering and Applied Sciences) will use his grant to develop a prototype of a fuel cell based on electrochemical acceleration of chemical weathering. A successful prototype would have applications both as a feasible approach to carbon sequestration (via air capture of carbon dioxide), and as an energy storage device for electric grid peak shaving and load leveling.

*Eftimios Kaxiras* (Gordon McKay Professor of Applied Physics, School of Engineering and Applied Sciences) will use state-of-the-art techniques in materials theory to explore inexpensive new catalysts for hydrogen generation, novel nanostructures for hydrogen storage, and environmentally-friendly biomaterials for light harvesting.

*Roy Kishony* (Assistant Professor, Systems Biology Department of Harvard Medical School) studies the organization of genetic, pharmacological, and ecological interaction networks in microbial systems. He will use his seed grant to analyze chemical perturbations of microbial soil communities as a way of understanding how complex natural ecosystems respond to environmental disturbances.

*Michael Kremer* (Gates Professor of Developing Societies, Department of Economics) will evaluate different forms of distributing municipal water supplies in poor, peri-urban neighborhoods in western Kenya. The study will assess the relative cost-effectiveness of these distribution systems and their impacts on child health outcomes.

*Zhiming Kuang* (Assistant Professor, Department of Earth and Planetary Sciences) will collaborate with Daniel Jacob and Jennifer Logan (both from the School of Engineering and Applied Sciences) to evaluate the potential of explicitly simulated clouds and convection in the modeling of global tropospheric chemistry.

*Sendhil Mullainathan* (Professor, Department of Economics) will use a unique dataset of electricity consumption patterns in Chicago to analyze how people make decisions about energy conservation.

*Doris Sommer* (Ira Jewell Williams Professor, Department of Romance Languages and Literatures) will explore representations of nature in artistic practices in Latin America and produce a book designed to facilitate classroom workshops about the representation of ecological issues in Latin American culture.

*Howard Stone* (Vicky Joseph Professor of Engineering and Applied Mathematics, School of Engineering and Applied Sciences) will begin a systematic development of the microfluidic tools necessary to address important issues (surface-scale phenomena, genetic evolution, and

phenotypic regulation) in environmental microbiology.

**Robert Wood** (Assistant Professor, School of Engineering and Applied Sciences) will develop a concept for a “micro autonomous underwater vehicle” using microfabrication technology. This aquatic microrobot, based on the size and morphology of minnows, will be designed to operate as a mobile sensor capable of tracking the movements and sources of water pollutants.

These nine seed grants total \$202,000. Since 2003, the Center has awarded 26 faculty research grants worth a total of \$800,000.

## Center Faculty Associates Receive Awards

The American Academy in Rome announced the winners of the 2007-2008 Rome Prize Competition in April. **Alan Berger**, Center for the Environment Faculty Associate and Associate Professor of Landscape Architecture at the Harvard Graduate School of Design was one of two winners selected for the prize in the Landscape Architecture category. The prize includes study funding, room and board, and a stipend while at the American Academy. Berger’s Rome Prize fellowship research will extend his work on reclaiming despoiled and derelict places for productive reuse by examining the role of design and landscape in the reclamation of Rome’s environs. The Pontine Marshes will serve as the point of departure for this research. Located southeast of Rome, the Pontine Marshes comprise an area of approximately 300 square miles. Mussolini, who realized that the Marshes were a vast landscape resource for Rome, successfully drained the marshes by 1935. Today the Marshes have varied land uses and more than 500,000 permanent residents. Berger’s fellowship work will critically analyze the significance of the reclamation of the Pontine Marshes landscape in the development of Rome itself, and contribute a chapter to Berger’s book-length manuscript on the implementation of landscape reclamation in urbanized regions. Berger will depart for Rome in September 2007 for 11 months to work on this research.

**Peter Girguis**, Center Faculty Associate and Assistant Professor of Biology in the Department of Organismic and Evolutionary Biology received a Lindbergh Foundation Award for developing microbial fuel cells (MFCs) as low cost power supplies for lighting in the developing world. Since 1987, the Lindbergh Awards have been presented each year to support individuals or companies working on technological solutions that improve our environment for a sustainable future. Girguis will use his \$10,580 award (a symbolic amount representing the cost of Lindbergh’s airplane, *The*

*Spirit of St. Louis*) to fabricate and deploy hundreds of these MFC lights throughout India and Mexico, in collaboration with NGOs and other groups that will provide feedback on how well the technology was integrated into the environment and culture. Implications for MFCs in developing countries are far-reaching, as they can be used to power lights, recharge batteries, and operate many other devices using nothing but soil, foodscrap, or animal dung as fuel.

Center for the Environment faculty and staff join in congratulating Girguis, Berger, and all Center faculty associates who have recently been recognized for their outstanding environmental research.

## Ecologist David Tilman Visits Harvard

G. David Tilman, McKnight University Professor in the Department of Ecology, Evolution, and Behavior, and Director of the Cedar Creek Natural History Area at the University of Minnesota spoke to a crowded lecture hall on April 23 about the importance of biodiversity for biofuel production.

Tilman described the results of his fieldwork on grasslands with high species variation, noting that since plant species compete for resources, coexisting species tend to use available resources more efficiently. His research demonstrates that these multi-species communities are a better source for biofuel production than the currently used single species crops.

Tilman’s lecture was the inaugural event in the new Biodiversity, Ecology, and Global Change lecture series sponsored by the Center for the Environment and organized by Jonathan Losos, Professor in the Department of Organismic and Evolutionary Biology, and Curator of the Museum of Comparative Zoology. “Professor Tilman gave a fascinating talk illustrating the links between the themes of this new lecture series. He’s set a high bar, but I am very optimistic that the speakers we bring in next year will be just as interesting and provocative,” says Losos.

The series will continue in the 2007-2008 academic year and will feature five scientists from across the country, including Jane Lubchenco of Oregon State University, Shahid Naeem of Columbia University, Richard Ostfeld of the Institute of Ecosystem Studies, Stephen Pacala of Princeton University, and Peter Reight of the University of Minnesota. Once finalized, the complete series schedule will be posted on the Center website, [www.environment.harvard.edu](http://www.environment.harvard.edu).

## Center Supports Research Opportunities for Undergraduates

This summer Harvard undergraduates will use Center funding to study ethanol production in Brazil, sustainable development in Cairo, and ecotourism's effects on macaws in Peru. These are just a few of the 11 proposals which were awarded grants through the Center's Undergraduate Summer Research Fund, established in 2002 to enhance the undergraduate educational experience at Harvard through the support of environmental research. This summer the Center is also expanding its student programs by encouraging more undergraduates to participate in summer research with Harvard faculty. The Center's new Summer Research Assistant Program sponsors up to ten weeks of an undergraduate research assistant's time to work on projects with Center Faculty Associates. This summer's research assistantships include: data analysis on air quality in Ghana (with Majid Ezzati of the School of Public Health); work on developing new materials

for fuel cells (with Shriram Ramanathan, SEAS); spatial analysis of deforestation effects in Thailand (with William Clark, Kennedy School); and cataloging insects and other invertebrate groups on the Boston Harbor Islands (with Brian Farrell, FAS). Between these two summer programs, the Center will award grants in excess of \$50,000 for undergraduate summer research.

## Environmental Events @ Harvard

If you are interested in receiving weekly e-mails during the academic year listing environmental events around Harvard, email your request to [jenny\\_macgregor@harvard.edu](mailto:jenny_macgregor@harvard.edu).

The Harvard University **Center for the Environment** is an interfaculty initiative affiliated with the Faculty of Arts and Sciences and serving the entire University.

The Center encourages research and education about the environment and its many interactions with human society.

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