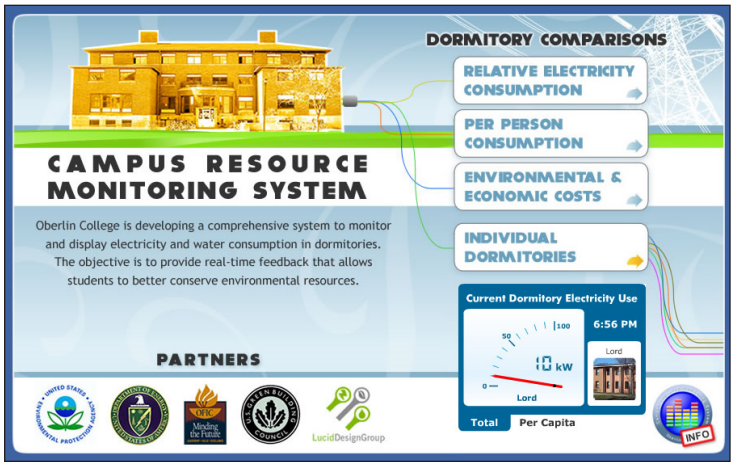
OBERLIN COLLEGE

ENVIRONMENTAL STUDIES PROGRAM

Annual Newsletter *Spring 2006*

Oberlin Unveils Campus Resource Monitoring System

Gavin Platt '06 and John Petersen '87



Home page of website that provides Oberlin students with direct access to real-time electricity consumption in dormitories (www.oberlin.edu/dormenergy)

What if a resident of Dascomb Hall could instantly view electricity being used by students in her wing and floor and then compare her group's consumption with that of others in Dascomb? What if a Harkness co-oper could compare last week's building water use to water use in Fairchild co-op or in Dascomb? What if residents in the new Union Street houses could get online to view graphs displaying the environmental consequences of electricity use during the last semester?

With these questions in mind, students, faculty, and facilities personnel have been working hard to develop a unique "Campus Resource Monitoring System" for Oberlin College. A campus-wide network of sensors and computer technology will eventually enable most residents of on-campus housing to view their electricity and water use via the web and to compare their personal environmental and economic impacts to those of students living in other dormitories and houses. The development of this system is premised on the notion that easily accessible real-time feedback on energy and water use increases awareness and motivation to act in ways that minimize dorm residents' consumption.

In the last issue of the Environmental Studies Newsletter, we reported on the development of a prototype data monitoring and display system that was used as part of a competition among Oberlin dormitories to reduce electricity and water use. With help from a $10,000 "Phase I" grant from the U.S. Environmental Protection Agency's "People, Prosperity and the Planet" (P3) program, students and faculty developed a wireless sensor network for two dorms, Harkness and Fairchild. This monitoring system allowed students in these two dorms to view their resource consumption in real-time via computer displays in the lobbies of these buildings and on the web. All other dorms received weekly feedback on the web in the form of manual readings of electricity and water use. Overall, during the two-week competition, students saved 68,500 kWh of electricity and 20,500 gallons of water. Students in the two dormitories with the real-time feedback system won the competition, reducing their electricity use by 55% during the competition, compared with a campus average of 31% for the other dormitories in the competition.

Based in part on these impressive results, the Oberlin College P3 team was one of only six P3 teams nationally to receive $75,000 in "Phase II" funding from the EPA. Oberlin was the only small liberal arts college and the only school without an engineering department to be among the winners. The technological goal the Oberlin team has set out to accomplish in Phase II is to expand the real-time monitoring system to include most of the dormitories on campus; the system is designed to provide 1,930 Oberlin students with real-time feedback on their resource use. Oberlin's Campus Resource Monitoring System will be the first system installed at any college or university in the world to provide students with feedback of this kind. The research goal is to assess how the presence of this real-time feedback affects attitude and consumption behavior.

This last year has been a busy one for those of us involved in developing the Campus Resource Monitoring System and significant progress has been made towards achieving the technological goal described above. Much of the planning took place last summer, installation of sensors began in earnest in the late fall and attention these last few months has focused on developing the website and Science Center lobby monitor that will be used to display data on resource use.

As the spring '06 semester came to a close, students in most Oberlin dorms could already view their electricity consumption on the www.oberlin.edu/dormenergy website. Students who visit the website can choose to view and compare rates of consumption during the last minute, over a variety of longer timescales, and expressed in energetic, economic and environmental currencies. By the end of the summer the website will allow students to view electricity consumption on individual floors of many of the monitored dorms and in several cooking and dining facilities. Over the next few years, our plan is to add sensors that will provide students with similar feedback on patterns of water consumption in the dormitories.

Environmental Studies faculty member John Petersen serves as the principal investigator on the EPA grant and has overseen development of the system. Computer Science major Chris Fry '06 has had primary responsibility for managing the data monitoring and display system for the project. Gavin Platt '06 has focused on building the graphical display component that people see when they visit the Science Center display and the website. Vladi Shunturov '05 has continued his involvement in the project, now as a partner in Lucid Design Group, the company that is providing the software and hardware that make the system possible. Design of the display has been a collaborative effort between Platt, Shunturov, Fry and Petersen. Next year's Campus Resource Monitoring System management team will include underclassman Lucas Brown '09.

A new aspect of the Phase II research team is its inclusion of faculty members Katy Janda (Environmental Studies) and Cindy Frantz and Steve Mayer (Psychology). With the near completion of the technological component of the system, these faculty members and their students will be joining Petersen in a long-term research project that examines the effects of information feedback on behavior and attitude towards the environment. The Campus Resource Monitoring System allows Oberlin faculty and research students to address a broad range of questions such as, what is the role of competition in stimulating changes in attitude and behavior? What kind of incentive systems and

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Visiting Professor Heidi Ballard

Heidi Ballard joined the Environmental Studies staff from California for this academic year. Heidi obtained her Ph.D. in Environmental Science, Policy and Management from University of California, Berkeley, in 2004. Her dissertation was entitled, "Impacts of Harvesting Salal (Gaultheria shallon) on the Olympic Peninsula, Washington: Harvester Knowledge, Science and Participation". Heidi is not unfamiliar with Ohio, having obtained a second M.A. from Miami University in the Department of Botany, after earning an M.A. at Stanford and teaching secondary science education for five years.

Here at Oberlin, Heidi taught Topics in Conservation Biology, an upper-division seminar for biology and environmental studies majors; Introduction to Environmental Studies, an introductory course for majors; and conducted guest lectures in Introduction to the Black River Watershed where her education expertise was used to prepare Oberlin students for the local public schools. Heidi also taught two classes that focused in her specialty and caught the interest of Oberlin students: Community-Based Forestry, an upper-division interdisciplinary seminar for majors and Non-Timber Forest Products and Forest Management Practices, an upper-division field-based course for biology and environmental studies majors.

In Non-Timber Forest Products and Forest Management Practices, the students first studied the international literature on non-timber forest products (NTFPs), learning about the practice of managing and harvesting crops and materials from forests for profit without destroying the forests. Examples include the collection of various mushrooms, medicinal plants, and building materials like palm fronds. A state forester from the Ohio Department of Natural Resources was invited to present information on developing forest management plans sharing a useful framework adopted by the class. The class also included an overnight field trip to Rutland, Ohio, near Athens, where students visited and talked to staff at two organizations, Rural Action and the National Center for the Preservation of Medicinal Herbs.

The students then studied the forest at the Jones Memorial Farm in Oberlin and developed a comprehensive written forest management plan for the Jones forest. The plan was presented to members of the farm's board of trustees and to the Oberlin Open Space Council. It included plans to establish mushroom logs and the collection of tree sap for making maple syrup products. The plan also suggested management practices such as the removal of the invasive exotic species. The plan was then used by the Introduction to Environmental Studies students during the spring semester and the ideas were incorporated into small group projects implemented at the farm. One group, under supervision of Sarah Waterman '04 and Aaron Englander '06, removed invasive buckthorn and other groups started mushroom logs, growing shitaki and oyster mushrooms to be harvested and sold to Oberlin Market.

While Heidi has enjoyed the year in Oberlin, she will be returning to California for a tenure-track position in Environmental Science Education at the University of California, Davis, in the School of Education.

Photo by Brandi Eng-Rohrbach '06

Associate Professor John Petersen, Facilities Mgr. / Lecturer Cheryl Wolfe-Cragin, Administrative Assist. Bev Burgess, Visiting Assistant Professor Heidi Ballard, Assistant Professor Katy Janda, Professor and Program Director David Orr (not pictured Visiting Professor Ben Wisner)

"Real-Time Energy Consumption Feedback: Effects and Implications for Different Types of Consumers"

Honors Project by Daisy Allen '06

For her honor's project, Daisy Allen set out to explore the question: "Under what social conditions does real-time feedback influence energy understanding and conservation behavior?" To pursue this topic, she completed an ambitious project that began with a thorough literature review in the fields of energy use, cognitive understanding, and interface usability. Building on this framework, she conducted a field study in the City of Oberlin to investigate the effects of income, environmental attitudes, and connectedness to nature on energy understanding and conservation behavior. Her fieldwork had two components: (1) a survey of 60 residents in two different income brackets, and (2) an empirical test of real-time energy consumption feedback in a sub-sample of ten households. Data gathered in the first phase of her research served as a baseline and control group for the second phase. Doing this work required an array of research methods, ranging from quantitative data manipulations to qualitative in-person interviews. Daisy hopes the results of this work will help Sustainable Community Associates develop a useful, meaningful feedback system for their forthcoming mixed-use, mixed income green development in downtown Oberlin.

Daisy's honor's work was sponsored by Katy Janda, Sylvestre Gaudin, and Cindy Frantz.

Oberlin Unveils...from front page

approaches to data presentation are most effective at eliciting change? How long do changes in attitude and behavior last? How much electricity, water and money are actually conserved when technologies such as water saving shower heads and energy-efficient lights are installed in dormitories? Answers to these questions are likely to be of value on other campuses and in other residential settings. This semester a group of students in Frantz and Mayer's psychology research methods course is working on a preliminary study examining whether students who publicly commit to resource conservation are more or less likely to conserve electricity, and whether the availability of real-time data influences their attitudes and behaviors.

As this article goes to press, members of Oberlin's P3 student team are gearing up to participate with Petersen in this year's P3 competition which, like last year, will take place on the Mall in DC, between the Washington Monument and the Capital building. Participants will include Jenna Trostle, Courtney Epstein, Callen Miracle and Molly Lidz (all '08). Michael Murray ('04), President of Lucid Design Group, will also be participating as a team member. Together with other winning groups from last year's competition, the Oberlin P3 team has been asked to exemplify successful development of technologies that solve environmental and social problems while also resulting in economic savings and opportunities.

Associate Professor John Petersen, Gavin Platt '06 and Vladislav Shunturov '05 participating in the EPA's "P3" competition on the Washington Mall in May of '05

New Solar Parking Pavilion Is Largest Photovoltaic Array in Ohio

by Betty Gabrielli

With the recent installation of 336 photovoltaic (PV) panels, the solar parking pavilion backing the College's Adam J. Lewis Center for Environmental Studies is nearly ready to go on line. The completion of the project makes Oberlin the site of the largest PV array in Ohio, and the Lewis Center the first entirely solar-powered building on any U.S. college or university campus.

The final phase includes testing this month by the architectural design firm, Solar Design Associates (SDA). The structure was funded by a $1 million grant from Adam J. Lewis.

The PV panels were installed in the 8,800-square-foot roof by Burgess Electric LLC, area specialists in solar and wind power. Sunlight collected by the panels will be transformed into a maximum of 100 kilowatts of electrical energy, bringing the center's total rated production (based on peak theoretical output under ideal conditions) to 159 kW, equivalent to the amount of energy needed to power nearly 15 single-family homes.

"With the installation of the parking pavilion, the College will have the largest photovoltaic array in Ohio and, I believe, the first entirely solar-powered building on any U.S. college or university campus," says David Orr, Paul Sears Professor and director of environmental studies.

Steven Strong, designer of the PV array and the solar pavilion, agrees. Strong, a noted solar advocate, designer, and author, is founder of SDA, which is based in Harvard, Massachusetts.

"When Oberlin's pavilion is finished it will be the first time any college or university has had an academic facility that is truly photovoltaic energy self-reliant," Strong says. "The beauty is that it's a win-win."

A win for the College, of course, and a win for the City of Oberlin, which will benefit when surplus electrical energy is exported into the municipality's grid.

"The Lewis Center will go from being an importer of electricity to being a net exporter of electricity on an annual basis," explains John Petersen, associate professor of environmental studies and biology. He estimates that the two photovoltaic arrays will produce about 30 percent more electricity than the Lewis Center consumes on an annual basis.

AJLC paking lot PV pavilion under construction

Preparing for Life without Fossil Fuels

by Lucia Graves '07

Juliana Ungaro '06 and Andy Barnett '07 put down their pencils and got their hands dirty during spring break, fulfilling an assignment that took them not only out of the classroom, but out of the country as well.

As members of *Ecological Design* seminar—taught by David Orr, director and Paul Sears Professor and director of environmental studies—the students traveled to eco-savvy communities in England to study state-of-the-shelf designs. They saw it all—energy systems, water use, construction materials—and brought their findings back to share with the class.

"We talked to people, interviewed people, and got their impressions," said Ungaro. "We learned so much more than we would have learned in the classroom."

Other students in the seminar traveled to communities in New York (Rachel Weinstein), California (Gavin Platt and Joy Cernak), and Arizona (Tom Anderson-Monterroso). They sought to answer one of the most pressing questions facing our future: How should people build habitation patterns for a world in which portable fossil fuels are fast disappearing?

"My students will be living in a very different world from the one I've been living in," says Orr. "The goal of this class is to engage students in rethinking patterns of habitation and setting new standards for community development."

Much like Orr's past seminars—whose students helped to design Oberlin's Lewis Center for Environmental Studies, the first academic building in the country to be powered entirely by sunlight—this year's design class hopes to come up with a prototype for its own eco-savvy village.

"I feel invested in the project—I really want it to be successful," Barnett says. "It changes the way you approach class material, because instead of learning to be prepared for a test, you're learning to be prepared for life."

Students in the seminar are certainly stepping up to the ecological plate. Those who traveled to eco-friendly sites during spring break did so of their own initiative. They canvassed the literature, decided where to go, and made a case to the class.

"David Orr had us come up with a list for the class of various communities we wanted to research," Ungaro explained. "I picked BedZED because I had heard of it while I was on the Oberlin-in-London Program last year."

In BedZED, a small eco-village in south London, Ungaro and Barnett learned that permeable concrete and "green roofs"—rooftops that grow semi-succulent plants in wire mesh—help prevent flooding and also save water. During rainstorms, water that falls on the roofs and concrete runs into storage tanks where it is used "to flush the loos."

High-pressure showers with aerated water allow citizens to further reduce water use. The sensation, though, is a bit strange. "Standing in the shower you get totally clean, but you can hardly feel the water coming down on you," says Barnett.

Most remarkably, BedZED has managed to reduce its reliance on personal transportation—which in the United States is the biggest utilizer of petroleum power—by 65 percent, thanks to a car-sharing program, a robust public transportation system, and an increasing number of stay-at-home jobs.

Other BedZED experiments were less successful. An attempt to get citizens to grow their own food, for example, was a flop. "People grew only a couple of tomatoes a year," Barnett says. "I think it's just more work than people are willing to put in."

While the trips were all very informative, Orr finds little time for the theoretical.

"This class is the first research and development wing of a real development that we hope to build and franchise and that we hope will change the way we think about habitation," he says. "It's not so much global warming that we're up against—because there are days in Ohio when that sounds pretty good—as much as climate destabilization. That means rising sea levels. That means bigger storms.

"We're doing a one-time experiment with planet earth," Orr warns. "And if it turns out badly, we'll have hell to pay."

Living Machine student operators march in the Big Parade with the float they created featuring a toilet planted with live plants!

L-R top: Lauren Shuler '09, Gavin Platt '06, Apostol Dyankov '06, Nathaniel Meyer '09, Zena Grecni '08, Elyse Perruchon '08 L-R bottom: Professor John Petersen '87, Mary Notari '07, Andrew DeCoriolis '07. Missing from photo: Anna-Martha Brown '06, Alex Chun '08, Ben Greene '06, Kevin Kralik '06, Christine Rollinson '08, Ashley Gam '07, Stacey Litner '06, Ella Ornstein '06, Kate Ortner '08, Emma Nolan-Thomas '08, Louie Weiss '09

EnviroAlums Update

Carl N. McDaniel '64, EnviroAlums Chair

EnviroAlums continues to advocate for Oberlin College adopting a comprehensive Environmental Policy and implementing that policy aggressively. Under the direction of Robert Stenger ('05, EnviroAlums Vice Chair), a letter in support of making all future buildings at Oberlin as green as possible was sent in December 2005 to President Dye and the Board of Trustees with some 150 alumni signatures. At the suggestion of EnviroAlums Steering Committee, President Dye invited Ray Anderson of Interface Corporation to present to Trustees at their June 2006 meeting the economically sound initiatives adopted by Interface that are intended to make Interface an environmentally sustainable corporation by 2020.

As you have read in this ENVS Newsletter and in the Alumni Magazine, environmental sustainability is generating more and more interest within the Oberlin community. EnviroAlums can play an important role in the greening of Oberlin and in advocating for substantive environmental education and actions on campus and in the larger community. The task is unbounded. We need your help! Please consider joining EnviroAlums and becoming active. See our web site for complete information (www.oberlin.edu/envs/oeeaa).

Lounging on the beach during my year off

John E. Petersen

When people I don't know very well learn that I have been on sabbatical, they sometimes ask how I am enjoying my vacation. I imagine them picturing me kicked back in a lounge chair, on a beach, tropical drink in hand. And I suppose that there is a small grain of truth in this – Nancy and Lily and I did spend a wonderful week in February windsurfing in a tropical location (with longtime friend and OC '89 ENVS grad Matt Wormser and family). However, for the most part, this has been an intense year of work for me centered on designing data monitoring and display systems at Oberlin and elsewhere.

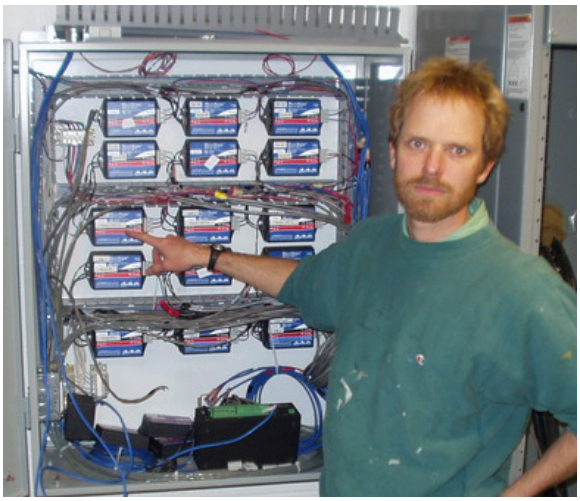
Lily Petersen enjoys the fact that her dad spent most of the year working from a desk immediately adjacent to her own.

All buildings implicitly communicate lessons to building occupants and visitors about the relationship between humans and the natural environment. As my colleague David Orr has pointed out, most of the existing building stock teaches the undesirable lessons that energy and materials are inexpensive and infinite, local biophysical conditions are not relevant to what humans do in a given place, and more generally that human culture and economy are not connected with or constrained by biodiversity or by the flows and cycles that drive and constrain natural ecosystems. One core goal of the emerging field of ecological design, as applied to architecture, has been to redesign the built environment so that it teaches desirable lessons of environmental stewardship and sustainability. Beginning with work on the AJLC, a great deal of my effort over these last six years at Oberlin has involved working with students to develop and apply data monitoring and display technology that fosters a better understanding of the flows of energy and cycles of matter that are necessary to support human activities in the built environment. The larger goal of this work is to break down alienation that exists between people and natural resources and to empower and inspire building visitors and occupants to think and behave in ways that maximize the environmental performance of people and buildings.

Towards this end, my work at Oberlin this last year has focused on planning and implementing a "Campus Resource Monitoring System" that will soon provide students with real-time graphics and text that depict and explain the energetic, economic and environmental implications of electricity use in Oberlin dormitories (see article in this issue). This has meant working with facilities personnel to understand the confusing complexity of wiring circuits that have evolved in each of Oberlin's dormitories over the last several decades as the energy demands of our student body have increased. It has meant: writing specification documents and installation instructions for contractors; reviewing bids; cajoling members of the Oberlin administration to allocate additional funds to compensate for budget shortfalls; and supervising and troubleshooting installation of sensors and dataloggers. It has also meant working with an exceptional group of Oberlin students to design the visual interface that dormitory residents will experience on the website and on a large computer display installed in the atrium of the Science Center. Finally, it has meant working with colleagues in Environmental Studies and Psychology to define the short and long-term research opportunities provided by this system. Oberlin will be the first school in the nation to implement a comprehensive Campus Resource Monitoring System designed specifically to engage, inform, empower and inspire students to better conserve resources.

Work on designing and implementing Oberlin's Campus Resource Monitoring System this last year has often felt like a full-time job in itself. However, my time has also gone into various other research and writing projects. This includes work on two *Continues on page 6*

Lounging...from page 5



Sensors installed to monitor electricity use for each of the new Union Street houses

books. One of these is a collaborative effort with colleagues at University of Maryland on a text that describes the use of experimental aquatic ecosystems as tools for testing ecological theory and developing scientifically sound resource management policy. The second is a book edited by David Orr and I that will bring together chapters by various figures in the field of ecological design who affected and were affected by the development of the Adam Joseph Lewis Center.

A significant fraction of time has also gone into helping Oberlin graduates Michael Murray, '04 Vladislav Shunturov '05 and Gavin Platt '06 to develop a business. Lucid Design Group, LLC (www.luciddesigngroup.com) was incorporated in Ohio in '04 with the goal, according to its business plan, of "making the environmental performance of the built environment visible and teachable in real-time". The company has spent much of the last year developing commercial hardware and software for acquiring, processing, storing and publicly displaying building performance data. Lucid recently completed a data monitoring and display system for Alma College in Michigan and is currently working with a variety of other schools, environmental non-profits, renewable energy generation facilities, and housing and apartment complexes to design and implement monitoring and display systems that stimulate learning and resource use reduction. It has been both exciting and gratifying to work with these former students to apply the power of real-time information feedback to other institutions and in other contexts.

Oberlin Energy Research

Avery Book '04

Oberlin families were deeply impacted by skyrocketing natural gas prices this past winter, and no one was harder hit than Oberlin's low-income families. For the past semester, members of the Youth Energy Squad have been researching the scope of this financial impact and the environmental impact on the Oberlin community.

The dynamic and highly collaborative Youth Energy Squad (YES) consists of Oberlin College students, recent alumni, Oberlin High School students, and adult community members. Since 2004, YES has lowered the utility bills of 60 low-income Oberlin families by performing simple weatherization, water efficiency, and energy efficiency measures in their homes, collectively saving over $30,000 per year for participating homes. This is not insignificant considering the fact that 20% of the City of Oberlin's population lives at or below the Federal Poverty Level, according to the 2000 U.S. Census.

This year, YES members built on initial research conducted in late 2004 to paint the "Oberlin Energy Picture." Through interviews with staff at Oberlin Municipal Light and Power System and Ohio Columbia Gas, YES was able to determine the current level of natural gas and electricity consumption in Oberlin. To calculate the environmental impact of this consumption, they simply plugged in various pollution coefficients. The social justice impact was determined through analyses of census data and correspondence with Oberlin Community Services caseworkers. The results of this research are at once sobering and a call to action.

In 2005, 82 cents of every dollar spent on electricity or natural gas left the Oberlin community. In aggregate, this totaled over $14 million, a $3.9 million increase over 2004. On average, one-half to two-thirds of average energy consumption can be avoided through energy efficiency measures. Think about it: The Sustainable Community Associates' East College St. Project will cost roughly $15 million. Through energy efficiency, Oberlin could have the funding to develop an "East College Project" every two years. The 2004 budget of the Oberlin City Schools totaled $5 million The $7 million kept in Oberlin would be enough to send 162 students to Oberlin College in 2006-07.

Oberlin also "exports" pollution. Every year, Oberlin electricity and natural gas consumption results in the emission of 1.2 million tons of carbon dioxide, 900 tons of sulfur dioxide, 2500 tons of nitrous oxides, 67 tons of particulate matter, 1700 tons of Volatile Organic Compounds. According to Ohio PIRG, "Ohio leads the country in air pollution, ranking 1st in soot-causing sulfur dioxide emissions, 2nd for the global warming gas carbon dioxide, and 3rd for both smog-causing nitrogen oxide and toxic power plant emissions." According to the federal US EPA, fine particle pollution from power plants shortens the lives of 1,743 Ohioans each year, causes 212 lung cancer deaths, 2,873 heart attacks, 27,521 lost work days, 1,638 hospitalizations, and 39,703 asthma attacks every year, 2,268 of which are so severe they require emergency room visits.

Energy consumption does not impact everyone in Oberlin equally. An Oberlin family of four earning area median income pays 6% of their monthly income on utilities, while a family of four at the federal poverty level pays 18%. Given that many low-income households in Oberlin live in older, under-insulated houses, many low-income residents spend closer to 23% of their income on utilities. In 2004, Oberlin Community Services provided 135 low-income households emergency utility shut-off assistance and approximately 50 households were turned away because of lack of funds.

As a response to this research, the Youth Energy Squad will be continuing and expanding its program goals. Another ten Oberlin homes will be weatherized this spring, and another twenty will receive services this summer. YES is also studying how it can expand its scope within the Oberlin community.

Questions or inquiries about the Youth Energy Squad should be directed to Avery Book, coordinator, at (440) 574-5436 or avery.book@gmail.com.

Student Awards

Gavin Platt received the Ohio Environmental Science and Environmental Engineering Scholarship through the Ohio Environmental Protection Agency's Environmental Education Fund administered by the Ohio Academy of Science.

Dorje Glassman was elected to the Phi Beta Kappa honors society.

Hanni Muerdter received the Leo S. Millar Prize in Biology

Kate Weinberger received the Hope Hibbard Memorial Prize in Biology for her honors research.

Recycling Assistants Celebrate Earth Day

Meredith Dowling '06

For Earth Day, the College Recycling Assistants held a number of educational events. The Recyclers set up a free tour of the BFI recycling plant and landfill; constructed a butterfly garden on South Quad; held an afternoon concert in North Quad; and held a consumption awareness event during TGIF.

At the consumption awareness event, Recyclers pulled the trash from the dumpsters of 5 of the 55 buildings on campus and piled it on a tarp in front of Mudd library so that volunteers could help sort it to determine what it is that Obies throw away. The rain chased the trash back to the dumpsters when only about 2/3 of it had been sorted, but they still came up with some interesting statistics:

- By volume about 20% of the material in Oberlin's trash is recyclable (31 bags of trash were sorted, retrieving 6 bags of recyclable materials). In the trash they found:
  - Coffee cups and other non-recyclable drink containers: 278!!!!!!!!
  - Plastic carry-out containers: 70!!!
  - A small pile of useful goods, including a t-shirt, socks, a number of reusable bowls and plates that simply needed to be washed, silverware, and a couple binders.
- Each week the College produces approximately 620 cubic yards of trash

This year's Recycling Assistants are Rob Chew, Meredith Dowling, Hannah McCorkel, Zibby Greenebaum,Trevor Walter, Steven Wong, Margaret Youngberg, Ariela Zamcheck, Ayla Zeimer, and Kirsten Zook.

Connecting Youth to their Environment through Education

Lina Yamashita '08

The Youth Energy Project (YEP) was originally established to teach Oberlin High School students about energy. In addition to teaching two classes of high school students, this year we also taught a class of fourth graders at Prospect Elementary School because I felt that educating students from a young age about the environment is crucial

Throughout the year, we held meetings in order to discuss what lessons to plan and how to teach them. We decided to split the group into two groups, one working on lessons for fourth graders with input from Prospect Elementary teacher Sheila Hicks, the other, for high school students with advice from teacher Donna Shurr. Before splitting up, however, we decided that the broad focus for high school students would be energy and for fourth grade students, food. We felt that teaching the younger students about food would be an effective, concrete way to encourage them to think about how their daily actions of eating are closely connected to the environment. We also decided that during the final lesson, the high school students would teach the fourth graders, and the topic for the lesson would combine food and energy by focusing on solar cookers. YEP participants who worked with the high school students included Daisy Allen '06, Catherine Noll '06, Kate Dirks '08, and Ben Mew '09; those working with the fourth graders included Zibby Greenbaum '09, Kate Lauth '09, and Ayla Zeimer '09.

I oversaw both groups, but worked mostly with the fourth grade group. We compiled a booklet of lesson plans making sure that each met at least a few of the State of Ohio standards of education for fourth graders. Lesson 1 focused on plants, specifically fruits and vegetables. The goals were to have students think about the different parts of plants they eat and realize that there is a great diversity. Lesson 2 focused on food, transportation and energy, and the objective was to teach students that there are many steps involved in transporting food, and that each step requires energy. Lesson 3 was "chocolate chip cookie mining," in which students pretended to be coal miners by digging for chocolate chips (coal) from the cookie (ground). The goal was to reinforce the fact that coal is a non-renewable source of energy and that when they eat the cookie, they are converting the energy contained in food to different kinds of energy, like heat, sound and motion. Lesson 4 involved an art project in which the students made decorative bowls out of plastic bottles. The objectives were to reinforce the concept of the three R's (Reduce, Reuse and Recycle) and teach students that the packaging waste from food can be transformed into art through creativity. Overall, the lessons were on food production, distribution, consumption, and on food waste.

decorative bowl made from a soda bottle

Meanwhile, the high school group gave a PowerPoint presentation during lesson 1, outlining the different types of energy and initiating discussions with the students. They also introduced the concept of the ecological footprint. During lesson 2, the high school students came to the Lewis Center to learn about how the building works. Doug McMillan, from the Ohio Municipal Light and Power System, brought the energy bike which converts the pedaling energy into electricity, which can then turn on light bulbs, a radio, fan and hairdryer. During lesson 3, the high school students spent time coming up with lessons and activities to teach the fourth graders.

The final, culminating lesson involved the fourth graders coming over to the high school. The high school students and fourth graders spent time building solar cookers from pizza boxes, and once they were finished, they put them outside and cooked s'mores. Meanwhile, the high school students did activities with the fourth graders that involved learning about energy and recycling. The objectives of this lesson were to encourage interactions between fourth graders and high school students and have them enjoy the lesson through food and games while learning about energy along the way.

solar ovens made from pizza boxes

Overall, I think that everyone involved – YEP members, high school students and fourth graders – learned something new and gained something in the end. Greenbaum and a few high school students were surprised by how much the fourth graders knew and how energetic they were. Because we feel that YEP should continue to educate the youth in Oberlin, we think that we can improve upon what we did. Noll reflects that she would like to see a greater focus on the applicability of the concepts taught in the classroom to the outside community.

Ultimately, as Dirks states, YEP's goal is to make young students aware of how energy and environmental issues affect our world and daily lives. The willingness and efforts of YEP members this year to volunteer and give up our time speak to our strong commitment in teaching young students. I hope that YEP will continue to build relationships with the Oberlin public schools and educate the students.

Obie, You Can Drive My Car

by Kelly Viancourt

It's 4:30 p.m. and the end of orchestra rehearsal on a Friday afternoon. Andy Barnett quickly packs up his clarinet and rushes out into the frigid February air, jogging down the street toward the Lewis Center for Environmental Studies, There, in the parking lot, sits a brand new, Oberlin-red Toyota Prius.

From his coat pocket Andy digs out a silver remote-entry device and waves it past the front windshield, signaling the doors to unlock. He sinks into the charcoal-gray fabric seat and reaches for the glove compartment, which holds the ignition key and a stack of pre-paid gas cards. Easing the car out of the parking lot, he then heads to the jazz studio, where three other students are waiting with a trombone, a bass guitar, and drums. "We have to pack smart, but we can all fit," Andy says.

A few minutes later, with Andy at the wheel, the students begin their 45-minute commute to downtown Cleveland, all the while savoring that new-car smell. Having access to transportation is pivotal to the rising success of these young musicians. Known regionally as the Oberlin Gateway Band—a five-member jazz/gospel ensemble committed to peace, justice, and God—they are being recorded tomorrow for their debut CD.

Andy, who plays piano with the band, is particularly excited about the ride; he is now known as the first customer of the first car-sharing program in the state of Ohio. The Prius, along with a red Scion xB wagon, were delivered to campus a day earlier for the launch of CityWheels, a start-up, Cleveland-based car-sharing business that chose Oberlin as its first destination. Credit for that goes to student members of Oberlin's Environmental Policy Implementation Group (EPIG), who campaigned for seed money from the College to partner with the company.

"Oberlin has the perfect conditions and the perfect culture for car sharing," says CityWheels founder Ryan McKenzie, a longtime advocate of green transportation. "Most of the time, students and residents can easily walk or bicycle to their day-to-day destinations. But everyone needs a car occasionally, and this is an easy, economical, and environmentally friendly way to obtain one."

President Nancy S. Dye says that part of the College's sustainability program is to find ways to show students that they don't need to own cars. "This program takes an important step toward greening our campus and community," she says.

Car sharing, a European phenomenon that made its way to the United States a little under a decade ago, has seen great success in 17 U.S. cities, spurred on in part by large, national chains such as Zipcar and Flexcar. In most cases, drivers become members of a car-sharing organization and pay a modest hourly or daily fee to access a car, typically parked in a dedicated space nearby. At Oberlin, membership is open to anyone 21 and older who has had a clean driving record for the past three years. The $8.50-per-hour price includes gas, insurance, maintenance fees, and road service. Reservations are made through the company's web site.

"Since all CityWheels vehicles are either gas-electric hybrids or other fuel-efficient models, they significantly reduce the environmental impact of driving," says Andrew deCoriolis '07, an EPIG member credited with initiating the CityWheels partnership. An environmental studies major with a passion for transportation issues, deCoriolis also played a major role in the College's recent purchase of hybrid vehicles for security officers and mail delivery.

Photos Courtesy of Eva Green

Andrew deCoriolis '07, and Nancy Dye stand in front of the 2006 Toyota Prius hybrid with Ryan McKenzie of CityWheels Cleveland.

"Transportation is at the heart of our sustainability efforts. The ways in which people move around will play a incredibly important role in shaping and defining America when cheap and easily portable oil is no longer available," he says.

Once the car-sharing program catches on—CityWheels currently has 35 members—McKenzie and deCoriolis hope to add a biodiesel truck or van to the Oberlin fleet. And as the company begins expanding car-sharing into the wide-open Cleveland market, all eyes will be on Oberlin.

"We are a very small organization, and we depend on community champions," McKenzie says. "The Oberlin students are true community champions—they were very motivated to bring this to campus as an environmental alternative to owning a car and as a way to get around." His hope is that Cleveland-area residents will pick up on the idea, too, particularly those in densely populated neighborhoods with access to bus and transit service. "Car sharing can act as the missing link," he said during a February radio segment on Cleveland NPR station WCLV. "You can rent a car, but it's a hassle. With transit, the choices are better in some locations than others. Taxis are notoriously unreliable. And having access to a car for a limited amount of time has not been an option in Ohio."

Expanding slowly and deliberately, McKenzie will introduce cars into the Cleveland neighborhoods of Ohio City, Coventry, and Shaker Heights this spring. "Our goal is to have a car in a variety of walkable neighborhoods, parked within a five to 10 minute walk from our customers," he says.

Convincing a car-dependent city the size of Cleveland to adopt car sharing is no easy feat, but it's certainly not impossible. In fact, car-sharing veteran Chris Bradshaw '66, co-founder of Vrtucar (pronounced virtue-car), an eco-friendly, car-sharing service in Ottawa, Canada, helped his own organization grow from three cars shared by 42 members, to 25 cars shared by 500 members in six years.

There's also Kate White '93, a founder and former co-director of City CarShare in San Francisco. Launched in 2001, it's now the largest nonprofit car-sharing organization in the country, with 4,000 members and 90 vehicles. New applications have skyrocketed in the past year with the rising cost of gas. A City CarShare press release says its members have saved 1 million gallons of gas since 2001.

As for Bradshaw, he couldn't be prouder of Oberlin's role in kicking off the car-sharing movement in Ohio. "My buttons are popping off my shirt," he says. "Oberlin is among the few colleges in the nation to do things before they enter the mainstream of society. This is just another feather in its cap." 1

For more information, visit www.citywheelscleveland.com/

Electricity: At What Cost? An Oberlin class researches the true cost of America's cheapest fuel

By Anne C. Paine

The American appetite for electricity is huge. Domestic coal generates half of the electricity supply in the United States, and increasingly larger amounts of that coal are being mined by mountaintop removal (MTR).

MTR—which involves blasting off the peaks of mountains to expose the coal underneath—is a burning environmental issue about which most Americans are unaware. The practice has made headlines in environmental journals, but attention in mainstream publications was limited until recently, when *National Geographic* devoted a feature-length article to the subject.

In West Virginia, MTR mining was first used on a small scale in the 1960s. But by the 1990s, the increasing size of mining equipment had made the practice more efficient, and it is becoming a dominant method used in the state.

Last fall, 30 politics and environmental studies students in David Orr's *Environmental Policy* course undertook a concentrated study of the use of MTR mining in West Virginia by the Massey Energy Company, the largest producer of Central Appalachian coal. "Policy is such an abstraction," says Orr, director and Dis-tinguished Professor of Environmental Studies. "The idea was to take an urgent issue, one that is central to every environmental policy on the books, and let students see how the policy works and how it doesn't work."

Orr invited guest lecturers to campus, activists opposed to MTR mining such as Mary Anne Hitt, executive director of Appalachian Voices, a grassroots environmental organization, and Jack Spadaro, a federal mine inspector and safety officer for 32 years. Spadaro, who investigated a slurry impoundment collapse in Kentucky in 2000, discovered that Massey Energy had known the site was unstable for 10 years. He was placed on administrative leave when he tried to press charges of criminal negligence.

Other speakers shared personal stories of harassment and intimidation. Larry Gibson, an independent activist who has refused offers by coal companies to sell the land held by his family for generations, has been subjected to gunfire and arson. The land, which includes a family cemetery, is valued at $450 million. Maria Gunnoe, a single mother and activist for the Ohio Valley Environmental Coalition, has lost part of her front yard and the bridge connecting her land to a public highway in flash floods caused by MTR mining.

A major focus of the Oberlin course lay with students' independent research projects, the results of which will assist Appalachian activists. Students took on the issue from several angles, examining aspects of the Clean Water Act and the Endangered Species Act in relation to MTR mining, researching who is legally permitted to challenge the practice in court, and studying media coverage of MTR mining. (See sidebars.)In support of MTR mining, the coal industry cites the economic importance of mining—which pays $1 billion in wages and accounts for nearly 13 percent of the state's gross product—to the West Virginia economy. At a July 2004 public relations event in Shepardstown, West Virginia, coal officials touted the rock's role as a present and future supplier of energy. They also argued that increased coal production could help win the war against terrorism.

"Coal keeps the lights on," said Roger Lilly in the *Washington Post*. A marketing manager for Walker Machinery Co., a supplier of heavy equipment for mountaintop mines, Lilly adds, "Coal today is a cleaner, greener fuel, and it's our bridge to the future. In terms of workers, MTR mining is cost-efficient for companies. An enormous dragline machine can replace hundreds of workers, requiring only a dozen or so employees on site.

But MTR mining is brutal to the environment. Forests covering the mountain are clear-cut, and powerful explosives are used to blast away 800 to 1,000 feet of mountaintop, exposing the coal seams. Draglines dig out the coal, which is trucked to processing centers to be washed and readied for sale. The resulting toxic slurry is retained in ponds called impoundments, capable of holding billions of gallons but prone to catastrophic failure.

Government studies have documented the devastating ecological effects of MTR mining in Appalachia. Hundreds of peaks have been flattened, and up to 1,000 miles of headwater streams have been buried. Lost are roughly 300,000 acres of some of the world's best hardwood forest habitat, reclaimed as flat grasslands, shopping centers, or commercial facilities. The U.S. Fish and Wildlife Service estimates that as many as 24 species, some already endangered, have been affected by the loss of forest and aquatic habitat.

Trees and animals aren't the only ones affected. Round-the-clock blasting can take place up to 300 feet from a home, shaking houses, cracking foundations, and exposing residents to nerve-wracking noise pollution. Because of the valley fills, which can be hundreds of feet deep and more than a mile long, residents are prone to flash floods and mudslides during rainstorms. Dust and debris from blasting contribute to air pollution, and local water supplies are often contaminated.

How is all this legal?

Despite the government studies, a seemingly minor change in wording in a federal rule has allowed MTR mining to thrive. The change, known as the Fill Rule and finalized in May 2002, substituted the word *fill* for *waste*. The change was a response to lawsuits charging that the coal industry's practice of dumping mining debris into valleys and streambeds violated the Clean Water Act. President Bill Clinton first proposed the Fill Rule but stopped action on it after enormous public outcry. President Bush revived the rule change in 2001, expanding the definition of fill to include "rock, sand, clay, plastics, construction debris, wood chips [and] overburden from mining." Thus the practice gained legal protection.

"The Bush administration has been determined to unravel 35 years of consensus on the importance of the environment," Orr says. "Teaching environmental policy now is kind of like teaching health care in an inner-city hospital emergency room on a Saturday night in July. It's mostly bad news."

While students' research projects got them intellectually involved in the issue of MTR mining, the stories they heard from the guest lecturers—who told of how MTR mining affected them, their families, and their communities—brought the issue to life in a very personal way. Many students were deeply affected by the class, and several joined Orr in a winter-term project to continue research to help local Appalachian activists.

"There's a kind of 'learning and labor' pedagogy in environmental studies," Orr says. "Not labor on the farm, but labor in terms of research applied to the practical. In teaching environmental studies, we try to bridge the world of ideas and the world of Main Street. We'll bundle up all the information from this class and really have an impact on an important issue."

Students' Research Aids Activists

Reporting from the Scene

Stacey Litner '06 had a skeptical bent. "I thought, 'Well, I'm hearing about MTR from David Orr's perspective, but what do people in the area think?'" So the triple major (philosophy, law and society, and environmental studies) traveled to Boone, West Virginia, during fall break, where she interviewed more than a dozen people, shot eight hours of video, and compiled a 33-minute DVD titled *Stories from the Ground: An Oral History in Threatened Appalachia.*

"I went with the intention of interviewing people recommended by an environmental group; I didn't realize that such opposite sides would be represented. When I realized this, I tried to also interview people who are in favor of MTR. But the coal miners can't talk about it or they'll get fired," she says. "Most of the people I talked to are afraid of losing their land. Lots of residents have already left—the coal companies buy their land and then demolish the houses." Seeing the destruction affected her deeply. "I was completely shocked that you can't see any of the destruction from the road," she says. "When I first got there, I thought it wasn't as bad as everyone had said it was. And then I saw it. It's bad."

Seeing MTR from Afar

What if people far from Appalachia could actually see the destruction caused by mountaintop-removal mining, visible mostly from the air? Gavin Platt '06 helped create a "virtual flyover" of a six-county area of West Virginia affected by MTR mining.

Working with the U.S. Geological Survey's Science Impact Center at Prescott College in Arizona, Platt added data to a digital elevation model to show not only the effect of leaching heavy metals from coal slurry impoundments, but also the locations of schools and homes in valley basins that could be affected by flash floods

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Framing Sustainability

David W. Orr

In June of 1858 Abraham Lincoln began his address at Springfield, Illinois by saying "If we could first know where we are, and whither we are tending, we could then better judge what to do and how, to do it." He spoke on the issue of slavery that day with a directness that other politicians were loath to practice. At Springfield he asserted that "A house divided against itself cannot stand . . . this government cannot endure, permanently half slave and half free." His immediate targets were the evasions and complications of the Kansas-Nebraska Act of 1854 and the Supreme Court ruling handed down in the Dred Scott decision as well as those whom he accused of conspiring to spread slavery to states where it did not already exist. In his speech Lincoln accused Senator Stephen Douglas, President Franklin Pierce, Supreme Court Justice Roger Taney and President James Buchanan of a conspiracy to spread slavery supported by circumstantial evidence such that it was "impossible to not believe that Stephen and Franklin and Roger and James all understood one another from the beginning, and all worked upon a common plan or draft drawn up before the first lick was struck." His opponent in the upcoming Senatorial election, Stephen Douglas, he described as a "caged and toothless" lion.

Lincoln had begun the process of "framing" the major issue of the day without equivocation but in a way that would build electoral support based on logic, evidence, and eloquence. On February 27, 1860, Lincoln's address at the Cooper Institute in New York extended and deepened the argument. He began with words from Stephen Douglas "Our fathers, when they framed the Government under which we live, understood this question just as well, and even better, than we do now," and proceeded to analyze the historical record to infer what the "fathers" actually believed. Lincoln in a masterful and lawyerly way identified thirty-nine of the founders who had "acted on the question" of slavery in decisions voted on in 1784, 1787, 1789, 1798, 1803, and 1820. In contrast to the position held by Douglas, Lincoln showed that twenty-one of the thirty-nine had acted in ways that clearly indicated their belief that the Federal government had the power to rule on the issue of slavery and the other sixteen who'd not been called upon to act on the issue had in various ways taken positions that suggested that they would have concurred with the majority.

Having destroyed Douglas' position, Lincoln proceeded to address the "the Southern people . . . if they would listen." He began with the assertion that every man has a right to his opinion, but "no right to mislead others, who have less access to history and less leisure to study it" and proceeded down the list of charges and counter charges in the overheated politics of 1860. His aim was to join the Republican cause with the Constitutional power to restrain the extension of slavery and not to assert the power of the Federal government to abolish it, while also saying bluntly that slavery was wrong. He admonished his followers to "calmly consider [the] demands" of the Southern people and "yield to them if, in our deliberate view of our duty, we possibly can." And then he closed by saying "LET US HAVE FAITH THAT RIGHT MAKES MIGHT, AND IN THAT FAITH, LET US TO THE END, DARE TO DO OUR DUTY AS WE UNDERSTAND IT." [emphasis is in Lincoln's text]

The Cooper Institute address was instrumental in Lincoln's election to the Presidency and also in framing the Constitutional issues over slavery and state's rights that had smoldered for seventy-four years before bursting into the conflagration of Civil War. As President, Lincoln further refined the issues of slavery, states' rights, and Constitutional law. His first inaugural address in 1861 Lincoln attempted to reach out to the "people of the Southern states," assuring them that he neither clamed nor would assert a right as President to "interfere with the institution of slavery in the States where it exists." The address is an extended description of the Constitutional realities as Lincoln saw them in which a national government could not be dissolved by the actions of the constituent states. The point was that the Union remained unbroken and that he'd sworn only to defend the Constitution and the union that it had created, not to abolish slavery. He regarded himself still as the President of the southern states and the conflict as a rebellion, not a war between independent countries. Lincoln admonished his "countrymen" to "think calmly and well" on the issues at hand and then closed with the words:

"I am loth [sic] to close. We are not enemies, but friends. We must not be enemies. Though passion may have strained, it must not break our bonds of affection. The mystic chords of memory, stretching from every battle-field, and patriot grave to every living heart and hearthstone, all over this broad land, will yet swell the chorus of the Union, when again touched, as surely they will be, by the better angels of our nature."

The call went unheeded and war came.

Through the next four years Lincoln continued to frame the meaning of the Constitution relative to the issues of the Civil War, but always in measured strokes looking to a horizon that most did not see. The Emancipation Proclamation carefully calibrated to the war situation and the nuances of keeping the loyal slave states neutral proclaimed only a partial emancipation, drawing the ire of the impatient. At Gettysburg, Lincoln in a masterpiece of eloquent concision based on years of arguing the principle "If men are created equal, they cannot be property" corrected the Constitution, in Garry Wills' view, without overthrowing it (Wills, 120, 147). The "unfinished work" he described was that of restoring the Union and, in effect, taking a country of states to "a new birth of freedom" as a nation with a government "of the people, by the people, for the people."

Lincoln's second Inaugural Address is the capstone of his efforts to frame slavery, the Constitution, and describe a nation dedicated to the proposition that all men are created equal. The setting was the final months of the Civil War with Confederate armies on the threshold of defeat. Lincoln's tone is somber, not triumphal. While both sides in the war prayed to the same God, the prayers of neither were answered in full. "The Almighty," Lincoln reminds the nation, "has His own purposes" which transcend those of either side in the war. Drawing from Matthew 7:1 Lincoln reminds the victorious not to judge former slaveholders "that we be not judged." Lincoln closes by saying "With malice toward none; with charity for all . . . let us . . . bind up the nation's wounds; to care for him who shall have borne the battle, and for his widow, and his orphan—to do all which may achieve and cherish a just and lasting peace."

From his earliest utterances on slavery to "charity for all" Lincoln progressively framed the issues of slavery in ways that left no doubt that he thought it a great wrong but that preservation of the Constitution was the prior consideration. When war came, Lincoln's first aim was to maintain the Union but he then used the occasion to enlarge the concept of a "nation conceived in liberty and dedicated to the proposition that all men are created equal."

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We are now engaged in a worldwide conversation about the issues of human longevity on Earth, but no national leader has yet framed a satisfactory vision of sustainability. It is still commonly regarded as one of many issues on a long and growing list, not as the linchpin that connects all of the other issues. Relative to the large issues of sustainability, we are virtually everywhere roughly where the United States was, say, in the year 1850 on the matter of slavery. On the art of framing political and moral issues, much of late has been written (Lakoff, 2004). What can be learned from how Lincoln cast the problem of slavery?

First, Lincoln did not equivocate or agonize about the essential nature of slavery. He did not over-think the subject; he regarded slavery as a great wrong and said so plainly and often. "If slavery is not wrong," he wrote in 1864, "nothing is wrong." Moreover, he saw the centrality of the issue to other issues on the national agenda such as the tariff, sectionalism, and national growth. Second, more clearly than any other political figure of his time, he understood the priority of keeping the Constitutional foundation of the nation intact and dealing with slavery within the existing framework of law and philosophy. He did not set out to create something from whole cloth but built a case from sources ready at hand:

the Bible, the Declaration of Independence, and the Constitution. Third, he used language and logic with a mastery superior to that of any President before or since. Lincoln was a relentless logician but always spoke with vernacular eloquence in words that could be plainly understood by everyone. Fourth, while the issue of slavery was a great moral wrong, Lincoln did not abuse religion to describe it. While his language was full of Biblical metaphors and allusions, he avoided the temptation to demonize the South and to make the war a religious crusade. Throughout the seven years from the House Divided speech to his assassination in 1865, Lincoln's is one of the masterpieces of political framing that combined shrewdness and sagacity with moral clarity. The result was a progressive clarification of the issues leading to a larger concept of nationhood.

From Lincoln's example we might learn, first, to avoid unnecessary complication and contentiousness. The issues of sustainability are primarily ones of fairness and intergenerational rights not ones of technology or economics, as important as these may be. Lincoln regarded slavery as wrong because no human had the right to hold property in another human being period, not because it was economically inefficient. This was magnetic North by which he oriented his politics. By a similar logic, ours is in the principle that no human has the right to diminish the life and well-being of another and no generation has the right to inflict harm on generations to come. Lincoln did not equivocate on the issue of slavery, nor should we on the tyranny one generation can now impose on another by leaving it ecologically impoverished. Climate change and biotic impoverishment are prime examples of intergenerational remote tyranny and as such constitute a great and permanent wrong and we should say so. Each generation ought to serve as a Trustee for posterity, a bridge of obligation stretching from the distant past to the far future. In that role each generation is required to act cautiously, carefully, and wisely (Brown, 1994). In Wendell Berry's words this "is a burden that falls with greatest weight on us of the industrial age who have been and are, by any measure, the humans most guilty of desecrating the world and of destroying creation" (Berry, 2005, 67).

Second, Lincoln built his case from sources familiar to his audience—the Declaration of Independence, the Constitution, and the Bible. In doing so, he took Jefferson's views on equality to their logical conclusion and recast the Constitution as the foundation for a truly more perfect union that could protect the dignity of all human beings. In our time we can draw on similar sources but now much enhanced by other constitutions and laws and proclamations of the world community. The Universal Declaration of Human Rights and Earth Charter, for example, describe an inclusive political universe that extends a moral covenant to all the people of Earth and all those yet to be born. It is reasonable to expand this covenant to include the wider community of life, as Aldo Leopold once proposed.

Third, Lincoln's use of religion is instructive both for its depth and for his restraint. He used Biblical imagery and language frequently, but did not do so to castigate Southerners or to inflate Northern pretensions. His use of religion was cautionary, aimed to heal, not divide. Lincoln oriented the struggle over slavery in a larger vision of an imperfect nation striving to fulfill God's justice on earth. The message for us is to ground the issue of sustainability in higher purposes resonant with what is best in the world's great religions but owned by no one creed.

Fourth, Lincoln understood the power of language to clarify, motivate, and to ennoble. Few, if any leaders have ever used words more powerfully or to better effect in a good cause than did Lincoln. This wasn't what we now call "spin" or manipulation of the gullible, but the art of persuasion at its best. Lincoln did not have speech writers to create his message and calibrate it to the latest polls. He wrote his own addresses and letters and is reported to have agonized sometimes for hours and days to find the right words. He spoke directly, often bluntly but softened by humor and the adroit use of metaphor and home spun stories. The result was to place the horrors of combat and the bitterness of sectional strife into a larger context that motivated many to make heroic sacrifices and a legacy of thought and words that "remade America," as Garry Wills puts it. Now perhaps more than ever we turn to Lincoln for perspective and inspiration.

The tragedy of the civil war originated in the evasions of the generations prior to 1861. The founders chose not to deal with the problem of slavery in 1787 and it subsequently grew into tragedy the effects of which are still evident. Similarly, without our foresight and action, future generations will attribute the tragedies of climate change and biotic impoverishment to our lies, evasions, and derelictions. But the issue of slavery and that of sustainability also differ in important respects. Slavery was practiced only in a few places and it could be ended by one means or another. The issues comprising the challenge of sustainability, on the other hand, affect everyone on the Earth and for as far into the future as one cares to imagine and they are once and for all time. Never again can we take for granted that the planet will recover from human abuse and insult. For all of its complications, slavery was a relatively simple issue compared to the complexities of sustainability. Progress toward sustainability, however defined, will require more complicated judgments involving intergenerational ethics, science, economics, politics, and much else as applied to problems of energy, agriculture, forestry, shelter, urban planning, health, livelihood, security and the distribution of wealth within and between generations.

Differences notwithstanding, Lincoln's example is instructive. He understood that the deeper problems of race had not been solved by war which had decided only the Constitutional issues about the right of states to secede. It did nothing to resolve the more volatile problems that created the conflict in the first place. He had the faith that they might someday be solved, but only in a nation in which strife and bitterness were set aside by the better angels of our nature. His aim was to create the framework, including the 13th amendment to the Constitution that prohibited slavery, in which healing and charity might take root. Lincoln continues to inspire in our time because he framed the legalities of Constitution and war in a larger context of history, obligation, human dignity, and fundamental rights.

The multiple problems of sustainability will not be solved by this generation or the next. Our role, however, is to frame them in such a way as to create the possibility that they might someday be resolved. Lincoln's example is instructive to us because he understood the importance of preserving the larger framework in which the lesser art of defining particular issues might proceed with adequate deliberation which is to say that he understood that the art of framing issues is a means to reach larger ends. In our time many things that ought to be and must be sustained are in jeopardy, the most important of which are those qualities Lincoln used in defining the specific issue of slavery: clarity, courage, generosity, kindness, wisdom, and humor.

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The Wonder of Science

Hanni Muerdter '06

In northern Ohio, warm weather was a long time coming. One night as I felt the first touch of a spring breeze, I hurried outside for a midnight stroll. Walking under the oaks, I realized how long it had been since I had smelled fresh buds and seen the shadow of new leaves dappling the ground. I stopped, awed by the spring night. I hadn't felt this distinctive feeling, wonder, in a very long time.

The next day in my ornithology class I thought about my previous night's walk. As my class observed a slide of pink avian bronchi, I realized how differently I was being taught science compared to the way I experienced nature the evening before. Thus far, I had approached my biology major with a deep interest in the subject, wanting to learn more, but rarely had I thought about why I was doing science or what its effects on the world might be. "One of the strongest beliefs of most practicing scientists is that knowledge is neutral: that the use of scientific knowledge for good or ill is dependent on specific applications downstream from the basic research, not inherent in the knowledge itself," Martha Crouch writes (1991:151). Crouch, a former tenured professor of biology at the University of Indiana, gave up her career because she felt her research with genetically engineered plants was allowing others to destroy the natural world that initially had attracted her to biology (1990).

Do my own professors—the scientists who most influence me—ask these questions and consider the larger implications of their work? Do they retain a sense of wonder while practicing science? And so I began a conversation with the faculty of the biology department.

"Why do you do your research?" I asked one. "Out of pure curiosity—there are so many exciting avenues to go into with protein channel research." Another professor said, "I am so intrigued by what I do—it keeps my intellect stimulated."

I was happy to find that most of my professors were excited about their subjects and are in this line of work because they enjoy it. But is being excited the same thing as objectively thinking about science's role in the larger context of the world?

"Do you ever feel a responsibility for what your research means for the future?" I asked a third professor. "In my line of research nothing ever really happens," he replied. "I'm not really in an area of science where my research will be of great concern that way. In medicine, on the other hand, the goal is to manipulate. Only if my work were negatively manipulated would I feel responsible."

We expect that the manipulators will be other people in the future, but manipulation itself is a difficult thing to recognize. We often do not know or cannot know what we have done even after we have done it. In 1928 Thomas Midgley Jr., a celebrated scientist credited with preventing engines from "knocking" by the addition of tetra-ethyl lead, discovered a nontoxic, nonflammable refrigerant, dubbed the "Miracle Compound." Forty years later, Mario Molina and Sherwood Rowland discovered that freon depletes the Earth's ozone layer. Even I fwe are not the direct manipulators, science builds on what comes before. How do we begin to conceive of the effects of our actions?

To manage one's own research and its consequences for science, one professor told me that "you have to compartmentalize." "You can't be idealistic forever," another said.

My professors had lots of advice concerning my struggle, but most communicated that they themselves don't struggle with issues like this anymore. In fact, the act of coming to them with these questions caused some professors to think I was giving up on science. I was not quitting, but is it too idealistic to not want to compartmentalize my life, at least not yet?

I started to search for a guiding principle that would allow me to generate these questions while still practicing science, and ran across Rachel Carson's *The Sense of Wonder*. Her description of her own sense of awe and reverence for the natural world reminded me of how I perceived nature as a child—feelings that had returned again onmy spring night walk. A child's world is naturally "fresh and new and beautiful, full of wonder and excitement," Carson writes (1965:42). It was this same feeling that initially pulled me to the study of biology. Similarly, one of my professors said, "Many of my colleagues became interested in biology and nature as a child."

Children are fascinated by rocks in the stream or how ants gather food. Children look at things not only with curiosity, however, but also with reverence. When they pick up a leaf, they marvel at its patterns and even though they might not yet know about xylem and phloem, they may appreciate trees in a more holistic manner than do many scientists. Children hold an inherent respect for nature that is sometimes forgotten as they grow older and "compartmentalize." One can have excitement and curiosity at any age, but that does not necessarily mean one has wonder. Wonder includes reverence, and acknowledges that we stand before this mystery with humility.

As these same children growolder and express an interest in science, they are encouraged to enter science fairs, read books, and major in some form of science at college. They find themselves probing deeper into their interests, carrying out research, publishing papers, maybe even getting a doctorate and pursuing tenure. As they do their research today, however, one might ask whether they still hold onto that wonder. Rachel Carson writes about this change in perception: "It is our misfortune that for most of us that clear-eyed vision, that true instinct for what is beautiful and awe-inspiring, is dimmed and even lost before we reach adulthood" (1965:42).

I told my professors I was worried I might lose that awe and respect that initially pulled me to learning about the natural world if I entered science. One professor reassured me that this would not happen: "I think the more knowledge I gain about my subject, the more wonder I have for it. Once I realize the mechanisms behind a certain behavior or adaptation, it is very fascinating." He was concerned, however, that with the urbanization of our culture, fewer students are coming from rural backgrounds or places where they have a regular relationship with nature. Many learn about native species for the first time through their textbooks and lectures. My professor asked, "What will this do to science?"

Although many of my professors said that their childhood wonder for nature initiated their career interests, I found it odd that this dynamic had never been acknowledged in any of my college classes. One professor told me, "Maybe some professors think about this, but I think many find the subject too informal to bring up in class. We have a syllabus and material that has to be taught—that we have to follow."

Is wonder too informal for science classes? Discussions of wonder would mean bringing up a not-so-tangible concept in a factually based class; perhaps the professors feel it is not scientific enough. Psychologist Abraham Maslow refers to this as the "law of amount of knowledge," commonly practiced by many scientists: "The greater the distance from personal knowledge, the greater the amount of scientific knowledge" (1966:17). In other words, to be "scientific," research has to exclude any human or emotional connection. Though wonder may be dismissed on these grounds by some, the question still remains: What kind of subject precludes discussing the human side of things? If anything, wonder is at the core of the subject, not an add-on.

E.O.Wilson acknowledges the connection that "humans subconsciously seek with the rest of life" (1992: 351). "Biophilia," for Wilson, allows us to "think more carefully and turn philosophy to the central questions of human origins in the wild environment" (1992:350-351). Wilson explains that human advance is determined not only by reason, but also "by emotions peculiar to our species" (1992:348). By examining ourselves, we realize that we are a species that evolved among other species, and thus have an inherent relationship with nature. Bringing wonder and larger questions into our world and to the classroom integrates feeling with intellect and allows us to remember that we are not only scientists but also part of a larger world.

And even if we do not feel comfortable talking about wonder, we at least need to talk about the larger questions involving the influence of science. If not now, when? "These larger questions are never brought up in graduate school—there you are encouraged to focus in even more on your subject, not to expand and consider the larger implications of your work," a professor told me.

Every scientist knows that the more narrowly one looks at a subject, the less one will see. Approaching one's research or ideas from several angles and asking more questions can lead to new insights and better understanding. I have often been encouraged in my science classes to do this, but when I asked some of my professors about "larger questions,"

several thought I wanted to talk about science on evolutionary or ultimate terms—realms still limited to what we consider science. What if we opened our framework and questioning even further to include yet more angles? Wouldn't that in itself be more scientific?

How can this questioning be supported in the scientific community? Wonder, as I have defined it, naturally generates the larger questions. The reverential aspect of wonder is a working reminder for us to do things not merely because we can but because we are certain they are important. The distinction between approaching science with a sense of wonder and approaching science with a sense of curiosity will naturally place different boundaries on our science—on how far we will go. If we let wonder re-center ourselves with reverence toward the natural world, we no longer need to "compartmentalize," either. For E. O. Wilson, the sooner we understand that we are a part of nature the "more quickly we will be able to discover the sources of human sensibility and acquire the knowledge on which an enduring ethic, a sense of preferred direction, can be built" (1992:348).

In the Wizard of Oz, when the true character of the Great Wizard is revealed, Dorothy is horrified that it is just a little man behind the curtain who she believed to be so grand. "Are you not a great wizard?" she exclaims. "Not a bit of it, my dear; I'm just a common man," the wizard replies (1984:154, original edition 1900). Perhaps today scientists have the appearance of being very, very good wizards, but are just common men and women. We are mesmerized by their razzle-dazzle and ability to unearth knowledge. But knowledge is not wisdom. Who is pulling back our curtains to ask these questions of what science is and what our knowledge will be used for?

At the beginning of the twenty-first century, we have no wise old man or woman to ensure that science is being used well for our humanity and our world. A sense of wonder can help with this by setting limits on what we do and providing a larger context in which to understand ourselves and the world. Perhaps Rachel Carson will be granted her wish—for each person to receive the gift of "a sense of wonder so indestructible that it would last throughout life" (1965:43) to help us navigate our way through our decisions. We all need the courage to pull back our own curtain and the curtain on science to take another look at what we assume to be true and right. And perhaps we will find that we are all good men and women and good wizards, but we are still human beings who need to bring a conscience to our work and our decisions.

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and the density and distribution of native and invasive species of plants. "The model can serve as an evocative policy tool, and because it's visually compelling, all audiences can understand it. After the USGS got our most recent data, they projected out 10 to 20 years, so the model can show the mountaintops going down and the number of coal slurry impoundments increasing," he says. An environmental studies major from a Pennsylvania mining community, Platt says the issues involved in MTR mining, such as the permanent transformation of the landscape, the fouling of water supplies, and the endangerment of local communities, "really hit home."

Harvesting Appalachian Wind

At Professor David Orr's suggestion, Mike Roth '06 studied maps showing average wind speeds in Appalachia and began to think it might be possible to harvest wind there. After researching the idea, the environmental studies major wrote an op-ed piece proposing that Massey Energy Company stop MTR and instead erect wind turbines; he submitted it to several publications.

"I framed the question this way: Mountains are a resource. How can you best use them? Is it possible to have a different type of economy in Appalachia, based on wind power and supported by farming, tourism, forestry, and underground mining? It has the potential to allow the coal companies to remain profitable, for local citizens to have jobs, for environmentalists to be happy because the mountains are still there, and for the politicians to be happy because they can get tax revenues from the energy sales." Based on evidence from preliminary studies, says Orr, a professional wind assessment company has agreed to pursue comprehensive studies of the wind speed on Kayford Mountain, owned by activist Larry Gibson. "Our goal is to turn Massey Energy from a seller of coal to a seller of electrons," Orr says.

Attracting Media Attention

Why does the media neglect MTR mining? Kate Rankin and Elisa Saltet analyzed media coverage ("or lack of it," says Saltet), and interviewed writers who've published stories in national publications. "Erik Reece, who's written for *Harper's* and *Orion*, said he believed the lack of coverage was due to the fact that not enough people have died, and it's hard to maintain public interest unless there are scary statistics," says Saltet, a third-year, double-degree student majoring in cello performance and environmental studies. She cited coverage of a slurry impoundment failure in Martin County, Kentucky, in 2000, which released 250 million gallons of slurry and wastewater, more than 20 times the amount of oil released in the Exxon Valdez spill. "The story only got about a week of coverage, primarily in Kentucky," says Rankin, a senior majoring in environmental studies and Japanese. The pair notes that MTR was listed among the top 10 overlooked stories in 2006 by Project Censored Media at Sonoma State University. "MTR is an issue of climate change, human rights, endangered species, and environmental justice," Saltet says.

Forcing Legal Compliance

Coal slurry contains many toxic heavy metals, including lead, mercury, chromium, and arsenic. Robin Hok, a fifth-year, double-degree student majoring in vocal performance and environmental studies, researched toxins legislation and recommended three possible legal tactics to oppose MTR mining. The first would have slurry ponds—which contain between 1 billion and 3 billion gallons—designated as EPA Superfund sites (sites with uncontrolled or abandoned hazardous waste). The second possibility would charge companies with failure to comply with reclamation requirements. "Companies say they'll restore the slurry ponds once they dry, but in the West Virginia climate, how long will it take for one billion gallons to dry?" she asks. The third tactic involves legislation requiring companies to report point-source releases above a certain level to the EPA. "Levels for some chemicals are very small. For example, only a pound of lead has to be reported. The coal companies have no idea how much lead is in their slurry ponds. If we could come up with an accurate way to calculate that amount, we could call the companies on the quantity of their toxic discharge.

Property Law Ineffective

In the United States, where individual rights are highly prized, it would make sense that property law would protect private landowners' rights, and that protection of private property would be a legal argument to oppose MTR mining. After environmental studies major Jon Beckhardt '06 reviewed relevant U.S. Supreme Court cases and read several texts on property law, he learned the exact opposite was true.

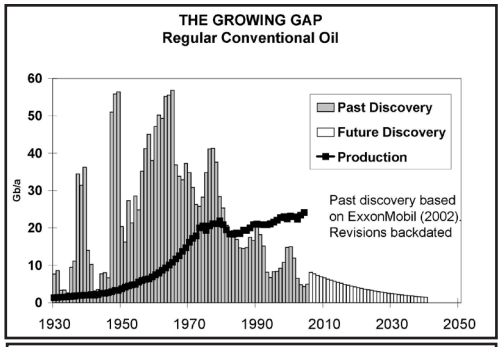
"Since the beginning of American history, we've put the common good ahead of the private good in property law," he says. "For example, in early New England there were no trespassing laws because everyone's land was viewed as open for hunting. More often than not, the federal government gives state and local jurisdictions the power to regulate their land. Only in situations where virtually all the value is taken from the land do they intervene." His conclusion—that the way property law is interpreted and applied in this country makes it an ineffective tool for opposing MTR mining—disappointed him. "I had imagined that the devaluation of Larry Gibson's land was just not being understood. So it was a hard conclusion to reach," he says.

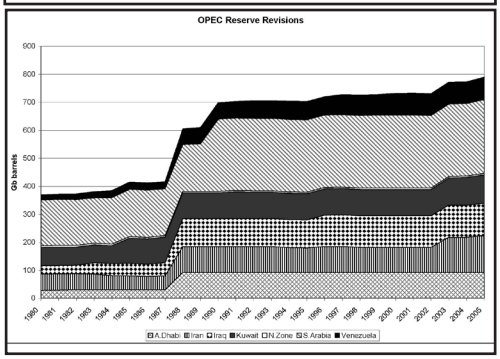
Peak Oil EXCO

David Huck '08

Peak oil, whether defined as the point at which production will begin to irreversibly decline or broadened to include the larger implications for society, is fast approaching. This spring, I took the opportunity to co-teach an ExCo (Experimental College) course titled "Peak Oil: Crisis and Catalyst for a Sustainable Future" with Grant Huling ('07, Politics). Though awareness of the general theory of depletion has grown tremendously in just the past year, misconceptions and confusion continue to pervade the issue—whether presented by the mainstream media or alternative news sources.

The first four classes focused on the immediate argument for peak oil—geology and how we use oil and energy in society. In our first class we detailed exactly why one should think that oil is depleting. The basic argument is that when producing oil, like any finite resource, the easiest to extract, cheapest energetically and highest quality reserves are produced first and the production curve, whether by field or country, tends to follow a bell shaped curve (although the mathematics end up being more complicated in most cases).[1]





As further evidence for a near term peak we find that (1) Discoveries peaked over 40 years ago (See Fig. 1)—we now use more than 4 barrels of oil for each one we discover, (2) Claims by OPEC that they can increase production are baseless, their reserves jumped for no reason other than changed quota rules in the late 1980's (See Fig. 2), with Kuwait recently admitting to exaggerated reserves[2] and depletion in their largest field [3](3) The claim that technology will lead to "reserve growth" is based on questionable extrapolations,[4] "adjustments based on non-technical [read political] considerations,"[5] and may turn out to not change the total production anyway.[6]

From this background in geologic facts the class moved on to discuss how oil is used in society and what alternatives may be available. Concerns of Energy Return On Energy Invested (EROEI)[7] were brought up, as well as scalability and the fact that many of the replacements are themselves finite. Though it looks as if no single replacement or combination thereof will provide fully for our needs, there are certainly many promising technologies that, especially if implanted while we are still on the left hand side of the curve, could go a long ways toward mitigating the decline.[8]

Throughout the course we focused on larger concepts, like that of infinite growth, that serve to make peak oil relevant in a larger context as well as provide a more grounded understanding of the world in which we are experiencing this depletion. Public figures like Bjørn Lomborg, Michael Lynch and many others have criticized depletion in general as well as the importance of oil to economic functioning. By reading analyses of their positions we attempted to show students where they may have gone awry and how one might argue with a "cornucopian."

Sooner or later one gets to thinking about how a post-peak or post-carbon future may look like. Though we do not have any perfect examples there are two that immediately come to mind—the collapse of the Soviet Union and Cuba during that collapse. Watching *The Power of Community: How Cuba Survived Peak Oil* got students excited about the way in which a country that lost half of its imports (from diesel to fertilizer to grains) overnight could transform its agriculture so completely. Obviously the lessons of Cuba do not apply perfectly to the United States or the rest of the world, but the resilience of the people and responses of the community are certainly heartening.

Other authors attempted to compare the collapse of the Soviet Union to what might happen in the United States or predict how the America might respond. Being studious, skeptical Oberlin students we rightly criticized many of these conclusions for being overly simplistic, based on poor data and inferences or just plain wrong. As Robert Hirsch said, "this thing is extremely complicated. My honest view is that anybody who tells you that they have a clear picture probably doesn't understand the problem."

Lack of concrete knowledge should not paralyze us into inaction. In many cases "preparations" for peak oil are also ways to have more livable cities, safer and better quality food and, most importantly, prevent the extremes of global warming. Though we do not ultimately know what the future may bring it is far better to employ the precautionary principle and prepare than to wait, hoping for cold-fusion or some other pipe-dream.

As is most likely the case with any ExCo, I gained even more respect for teachers, especially those in environmental studies. I had to think through everything very carefully—and as a result have a better idea of where I stand on peak oil and then some. Teaching a course on, at the very least, the end of the American Dream is not an easy task. No one really wants to find out that life as they know it isn't going to go on forever into a shimmering Utopia. Sadly, peak oil will probably not even curb carbon emissions in the short term and could quite easily lead to increased environmental degradation on all fronts.

As the ExCo progressed, underlying emotional, psychological and philosophical currents surfaced. Students questioned what their goals in life meant and what was actually the most important for them. It was a bigger shock to some than others, but it seemed that most, myself included, came away with a more stable and comprehensive outlook on the future. If nothing else, we live in interesting times.

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David Huck is a sophomore majoring in Environmental Studies. He will be teaching a revised Peak Oil ExCo next year and forming a student-faculty group to explore energy issues in greater depth and educate the community about peak oil. Some members of the course also recently attended a University of Maryland Conference on peak oil and the environment. He can be reached at david.huck@oberlin.edu.

1 First introduced by geologist M. King Hubbert in 1956 when he (accurately) predicted that US production would peak between 1965 and 1971. Though his reputation was in shambles until nearly 10 years later, he hit the nail on the head: US production peaked in 1970/71 and set the stage for the 1973 embargo (a previous one had been attempted by OPEC during the 1967 war, but West Texas had enough spare capacity to render it ineffective).

2 "Kuwait oil reserves only half official estimate-PIW." Reuters: Jan. 20, 2006 archived at: http://energybulletin.net/12242.html

3 James Cordahi and Andy Critchlow. "Kuwait Oil Field, World's Second Largest, 'Exhausted'" Bloomberg.com: Nov 10, 2005 archived at: http://energybulletin.net/10878.html

4 Extrapolating from West Texas (1940-70) to Saudi Arabia (1970-2000) is a bad idea. See Heinberg, 2005 and ASPO Newsletter, March 2006, "USGS study revisited"

5 Energy Information Agency, Annual Energy Outlook 1998, p.17

6 John Malcolm Gowdy and Roxana Julia. "Technology and Oil Field Exhaustion: Evidence from two Mega-Oilàelds." Rensselaer Working Papers in Economics: 2005

7 If you put in more energy than you get it out, it is a loss. Unless you have a source to subsidize said extraction, like cheap coal to provide electricity for stripper wells in W. Virginia, then extraction will ultimately cease. Oil had an EROEI of up to 100:1 in the early days. Now it is down below 20:1 with things like tar sands requiring one barrel for every three they produce. Continued lifecycle analysis suggests that ethanol, outside of the tropics (Brazil) hovers just around 1:1.

8 Robert Hirsch. "Peaking of World Oil Production: Impacts, Mitigation and Risk Management." SAIC for Dept. of Energy: Feb. 2005 archived at: http://www.netl.doe.gov/publications/others/pdf/Oil_Peaking_NETL.pdf

RECENT PUBLICATIONS & GRANTS

Heidi Ballard:

Fernandez-Gimenez, Maria E. and Heidi L. Ballard. In review. How Community-Based Collaboratives Learn: Ecological Monitoring and Adaptive Management, in Firehock, Karen and E. Franklin Dukes, (eds.) Effective Collaboration for Natural Resource Management and Environmental Protection.

Ballard, H. L. and L. Huntsinger. In press. Salal Harvester Local Ecological Knowledge, Harvest Practices and Understory Management on the Olympic Peninsula, Washington. Human Ecology: An Interdisciplinary Journal Vol X (X).

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Katy Janda, Publications and Presentations:

(Note: names underlined below indicate undergraduate student contributions.)

Janda, K. 2006. "The Eleventh Event: Public Perceptions of the Solar Decathlon." In *Solar 2006*, Proceedings of the American Solar Energy Society (ASES), July 8-13, 2006. (forthcoming).

Allen, D.(OC '06) and K. Janda. 2006. "The Effects of Household Characteristics and Energy Use Consciousness on the Effectiveness of Real-Time Energy Use Feedback: A Pilot Study." In *Proceedings of the American Council for an Energy-Efficient Economy 2006 Summer Study*. Volume 7, "Human and Social Dimensions of Energy Use" ACEEE: Washington DC.. (Refereed Venue, forthcoming)

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Janda, K. 2006. Four lessons ("Extrapolating Energy", "Dynamics of Consumption", "Size Matters", and "Classrooms as Pedagogy") accepted for publication in *147 Tips for Teaching Sustainability: Integrating Environmental, Economic, and Social Dimensions*. William M. Timpson, Brian Dunbar, Gailmarie Kimmel, Brett Bruyere, Peter Newman, and Richard Gilliland (eds). Atwood Publishing: Madison, WI. (In press)

Shunturov, V (OC '05)., J. Petersen, K. Janda, G. Platt (OC '06), K. Weinberger (OC '06), and M. Murray (OC '04). 2005. "Does Providing Dormitory Residents With Feedback on Energy and Water Use Lead to Reduced Consumption? An Assessment of the Effect of Different Resolutions of Feedback" in *Proceedings of Greening the Campus VI* Ball State University: Muncie, IN. pp. 157-172. Also in review for *The International Journal of Sustainability in Higher Education.*

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Merrett, S. (OC '05) and K. Janda. 2005. "Waste=Fuel: Affordable Biodiesel For Healthy Communities" In *Solar 2005*, Proceedings of the International Solar Energy Society (ISES) Solar World Congress in Orlando (August 8-12 2005). (Refereed Venue)

Janda, Kathryn B., and A. von Meier. 2005. "Theory, Practice, and Proof: Learning from 'Buildings that Teach.'" In *Sustainable Architectures: Critical Explorations of Green Building Practices in Europe and North America,* Simon Guy and Steven A. Moore, Eds. Routledge/ Spon Press. pp. 31-50 (Refereed Venue)

In addition to the above, Katy has presented her work on solar housing and building performance at the 2005 U.S. Green Building Council's annual conference (Atlanta, GA), the 2006 International Solar Cities Congress (Oxford, UK), and the 2006 Environmental Design Research Association's annual meeting (Atlanta, GA).

Recent Grants for Janda:

Janda, K. 2005. $15,100 grant award from Oberlin College/ University of Michigan/Kalamazoo College Collaboration Program (OKUM) for empirical research project on the use of solar housing entitled "*Producing Power: Consumption Practices of Solar Citizens*."

Janda, K. 2005. $3,034 H.H. Powers Travel Grant to support empirical research at innovative solar housing sites in the United Kingdom. Project title: "Building in Social Strategies: Solar Citizens or Consumers?

Major Co-Investigator for $75,000 design competition grant award: Petersen, J.E., Frantz, C., Janda, K. and Mayer, S. U.S. Environmental Protection Agency "People, Prosperity and the Planet" (P3). Project title: "Developing and Assessing the Impact of a Socio-Technological Resource-Use Feedback System for Improving the Environmental Performance of Buildings and Institutions".

Janda, K., T Lopez, J. Petersen & B. Richards. 2005. " $8,000 Curriculum Development Grant for a new, cross-divisional, team-taught course: ENVS 212 "Making Solar Music: Electronic & Unplugged. ENVS 212 will draw upon faculty and student expertise in physics, music, and environmental studies to explore the use of sound and music in articulating environmental phenomena. Katy Janda and Tom Lopez (computer music and musical systems design) will co-teach this course with assistance from Bruce Richards (musical acoustics) and John Petersen (systems ecology

David Orr's publications include:

Design on the Edge: The Making of a High Performance Building (MIT Press: 2006); and

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John Petersen:

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Petersen, J.E. and Englund, G. 2005. Dimensional approaches to designing experimental ecosystems: A practitioners guide with examples. Oecologia. 145: 216-224 (Special edition devoted to Spatial Scaling issues in Ecology)

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Recent grants awarded to Petersen:

Petersen, J.E., Frantz, C., Janda, K. and Mayer, S. 2005. $75,000 design competition grant award from U.S. Environmental Protection Agency "People, Prosperity and the Planet" (P3). Project title: "Developing and Assessing the Impact of a Socio-Technological Resource-Use Feedback System for Improving the Environmental Performance of Buildings and Institutions".

Petersen, J.E. 2005. $10,000 grant award from Ohio Foundation for Independent Colleges. Project title: "Development of a System for Real-Time Energy Performance Feedback as a Mechanism for Engaging Students in Campus Energy Management".

Ben Wisner's publications include:

2006 -- with Brenda Phillips Elaine Enarson, Cheryl Childers, Betty Hearn Morrow, and Deborah Thomas, *Social Vulnerability to Disasters*. Norman, Oklahoma: Fire Protection Publication Series of Oklahoma State University (forthcoming).

2006 – *Let Our Children Teach Us: A Review of Education and Knowledge Management One Year after Adoption of the Hyogo Framework of Action*. Commissioned by ActionAid International for the ISDR Inter-Agency Task Force Cluster Group on Education. London and Geneva: ActionAid and ISDR, May.

2005 – (Theme co-editor (with Kent Mathewson) on work on J. M. Blaut, *Antipode* 37(5), November 2005.

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Environmental Studies Program Guest Speakers 2005-06

"Growing a Sustainable Local Food System: Lessons from Appalachia" was presented by **Leslie Schaller**, Food Ventures Director of the Appalachian Center for Economic Networks, Athens, Ohio. Right here in Ohio, the Appalachian Center for Economic Networks (ACENet) has built an impressive model for a community-based food economy that creates jobs and supports farmers in one of the poorest regions in the U.S. The event was sponsored by the Ecological Design Innovation Center (now known as The New Agrarian Center).

Maria Gunnoe and Larry Gibson, West Virginia residents and environmental activists spoke on mountaintop removal in their own backyards in the Environment & Society and Environmental Policy classes. See their story in the January/February issue of "Orion" magazine "Moving Mountains—The Struggle for Justice in the Coal Fields of Appalachia".

Wilson Orr, Research Faculty member of Prescott College and Director, USGS Science Impact Center for Visualization , and managing partner of Blueline, Consulting Group, gave a presentation entitled, "Visualization of Mountaintop Removal Impacts in Appalachia." in the Environment & Society and Environmental Policy classes. Wil and his team work to develop practical applications for state, regional and local governments from scientific and technological advances within USGS, NOAA, DoD, NASA and other federal agencies.

Gloria Flora, Forest Service whistleblower and currently Director of Sustainable Obtainable Solutions (S.O.S.), a nonprofit organization, lectured in the Environmental Policy class (also open to the public). Sustainable Obtainable Solutions is a nonprofit dedicated to ensuring the sustainability of public lands. During her 22 years of work with the U.S. Forest Service, she served in numerous resource management positions throughout the Intermountain West. Most recently, she was the Forest Supervisor of the Lewis & Clark (Montana) and the Humboldt-Toiyabe National Forests (Nevada/California). Well known for her leadership in ecosystem management and public involvement, she made a landmark decision to prohibit oil and gas leasing from the Rocky Mountain Front in Montana. She later resigned from the Forest Service to call national attention to persistent anti-federal activities in Nevada.

Mary Anne Hitt, Executive Director of Appalachian Voices, a conservation organization located in Boone, NC, lectured on "Mountaintop Removal and the Struggle to Save the Heart of Appalachia". Appalachian Voices is helping to end the practice of mountaintop removal coal mining by working with community organizations in coalfields and organizing a national educational campaign.

A lecture and film screening "Autonomous Bodies/Autonomous Territories: Scenes from Radical Social Movements in Mexico" was presented by **Estela Kempis Robles, M.D.**, women's health advocate and **Greg (Gringoyo) Berger**, community documentary maker.

Tom Koontz, Associate Professor/Chair, Graduate Studies Committee and Academic Coordinator of the School of Environment and Natural Resources of The Ohio State University and graduate student **Scott Hardy** gave a guest lecture in ENVS 101 about "Policy Approaches to Environmental Problems and Collaborative Environmental Management".

"Grassroots New Orleans" was presented by **Malik Rahim** along with students' photography of the New Orleans communities. Rahim, veteran of the Black Panther Party in New Orleans, for decades has been an organizer of public housing tenants and a recent Green Party candidate for New Orleans City Council. He is the founder of Common Ground Collective, a locally run organization offering assistance, mutual aid and support to New Orleans communities that have been historically marginalized. The collective offers free medical clinics, neighborhood distribution centers, eviction and legal advocacy, rebuilding and detoxification, multi-media resources, and community cohesion in the face of this tragedy of nature and failure of the state.

The Roosevelt Institution at Oberlin, a student non-partisan policy research organization, along with the Economics Department and Environmental Studies Program sponsored a catered dinner/lecture launch event which included speakers **Richard Morgenstern**, environmental policy expert and Oberlin alum (OC'66), **Mark Katz**, political humorist, joke-writer for the Clinton administration, **Quinn Wilhelmi**, national executive director of the Roosevelt Institution, and **Jeffry Armbruster**, Ohio State Senator of the 13 district (Oberlin's district). Dick Morgenstern spoke on "The Future of Environmental Policy." He is a senior fellow in the Quality of the Environment Division of Resources For the Future. His research focuses on economic analysis of environmental issues and the use of economic incentives to address global climate change.

Environmental Studies co-sponsored with Hispanic Studies a lecture by **Dr. Mac Chapin**, Director of the Center for the Support of Native Lands. Dr. Chapin presented his organization's work, conducted over the past 13 years, in indigenous mapping. He gave a case study, with slides/powerpoint, of the mapping they have done with the Kuna Indians of Panama. The maps are used to claim and defend territory, plan for sustainable economic development and strengthen political organization and cultural identity.

Jack Spadaro lectured on "Mountaintop Removal: Politics, Economics and People". Jack has been featured on "60 Minutes" and "2020" for his work to enforce the Mine Reclamation Act. He is the Superintendent for National Mine Health and Safety Academy which is the principal training facility for all federal Mine Safety and Health Administration inspectors and for other mining interests. He holds a BS in Mining Engineering from West Virginia University and has won several public service awards for his humanitarian efforts.

Guest Speakers **Dr. Tom Smucker** (South Florida University) **and Dr. Edna Wangui** (San Francisco State University) lectured on the progress of poverty reduction, environmental conservation, and human rights in Kenya.

A panel discussion with Professor **David Orr**, Director of Environmental Studies and **Sylvestre Gaudin**, Assistant Professor of Economics on "Eating Seafood Doesn't Have to be Scary" was sponsored by Bon Appetit Management Company.

The Adam Joseph Lewis Center for Environmental Studies was a site on the **Northeast Ohio Solar Tour** sponsored by Green Energy Ohio and the American Solar Energy Society.

David Beach from EcoCity Cleveland gave a lecture in ENVS 101 entitled "Bioregional Planning". *Continues on page 18*

Environmental Studies Program Guest Speakers 2005-06 ...from page 17

Screening of film "Hope, Seeds, and Concrete: hosted by **Esther Muchiri**, Mid-West Program Coordinator, Heifer International and discussion of Heifer Mid-West projects and program with the George Jones Farm and Nature Preserve sponsored by the New Agrarian Center.

Dr. Diana Fox (OC'88), Associate Professor Anthropology, Bridgewater State College lectured on "A Gift from God: Gender and the Feminist Ethnography of Water in Three Trinidadian Communities". Dr. Fox's lecture reported on a preliminary ethnographic study of water acquisition, management and distribution processes in three Trinidadian villages.

John Todd, an internationally recognized biologist and author, and **Nancy Jack Todd**, co-founder with John Todd of the New Alchemy Institute and author of many works, lectured on "Bioshelters, Ocean Arks, & Living Machines". Nancy discussed her new book A Safe and Sustainable World. Ocean Arks International, founded in 1981 by visionary ecological designer Dr. John Todd, is a global leader in the field of ecological water purification. In response to the alarming rate of natural resource exploitation and depletion, their mission is to disseminate the ideas and practices of ecological sustainability throughout the world. Nancy Jack Todd is Vice President of Ocean Arks International and editor of its journal *Annals of Earth*. The Todd's also held a discussion over lunch with the current student Living Machine Operators working and conducting research at the Lewis Center.

Will and Erika Allen lectured on "Growing Power: Growing a Sustainable Food System from the Grassroots Out", their efforts to promote urban agriculture in Milwaukee and Chicago. Growing Power, founded by Will Allen-- a retired professional basketball player who utilizes food and the production of food to build community, empower youth, and address issues of food access in the inner-city-- is the last remaining farm in inner-city Milwaukee. Based on a 2-acre site, Growing Power promotes sustainable urban agriculture. They are pioneers in vermicomposting (composting brewery and restaurant waste using worms), aquaponics (raising fish and using fish effluent to fertilize crops), and sustainable agriculture production appropriate to urban-scale farming. The community potluck and lecture was sponsored by the New Agrarian Center and Heifer International.

Wind Power for Oberlin?

Michael Roth '06

In the fall of 2003, the city of Bowling Green, Ohio, built the first utility scaled wind turbines in the state of Ohio. Two Vestas 1.8 MW turbines reaching nearly 400 feet in height were constructed followed by two additional turbines in the fall of 2004. The four turbines have a total peak capacity of 7.2 MW, and in 2005, produced 13.2 million kWh of electric energy, enough to power roughly 1500 homes. The turbines are responsible for displacing roughly 65,000 lbs of N0x, 178,000 lbs of S0x and 26,000,000 lbs of C02 per year.

Located roughly 45 miles west of Oberlin, Bowling Green is very flat, has a municipally-owned electric utility and is populated by a community that is supportive of green practices. Since Bowling Green and Oberlin share many similarities it makes one wonder, "Could Oberlin support a similar utility scaled wind farm?"

In the fall of 2004 I enrolled in Physics 068, the Energy Technology class. The second half of the class was a small wind workshop in which we researched exactly what needed to take place in order to determine if Oberlin has sufficient wind to support an economically viable wind farm. We found that it is necessary to measure wind speeds for roughly a year at heights as close as possible to the actual hub height of a potential turbine. In Bowling Green a 160-foot monitoring tower was used in order to measure wind speeds at 3 different heights. In addition to adding redundancy to the data, the sensors at different heights provided enough data points to extrapolate and predict wind speed at the actual height of the turbine.

After taking more environmental classes in the spring and talking with professor John Scofield over the summer I returned to campus in the fall determined to find out if Oberlin could economically support utility scaled turbines and potentially become the first city and college in the world to be powered solely by wind turbines. We spent the fall writing grants as well determining the required equipment for the project. In April of 2005 we received a $13,000 grant from the City of Oberlin through Oberlin Municipal Power & Light's sustainable reserve fund and ordered the 160-foot monitoring tower, data logger, and sensors, required to carry out Oberlin's first wind turbine feasibility study.

In the fall of 2005 we hit the ground running and with the help of the New Russia Township (NRT) trustee Richard Williams we identified a monitoring site on the NRT nature reserve located on the corner of Rt. 58 and Butternut Ridge road. We also received permission from the Federal Aviation Administration (FAA) and New Russia Township Board of Trustees to raise the tower, as well as tested and programmed the monitoring equipment in the Physics lab. In November, the last requirement was to obtain a commercial building permit from the state of Ohio. This permit requires the signature of a state certified engineer as well as drawings ensuring that the tower's structure is mechanically sound.

Acquiring this permit proved to be difficult. While Leo Evans, Office of Facilities Planning, worked on the permitting process, we decided to pursue another monitoring site on the southern part of town. With funding from the Schaening Memorial fund as well as the Jerome Davis fund and the help of a local ham-radio operator, I purchased and installed sensors on a pre-existing 90-foot tower. It is currently the highest wind-monitoring tower in Oberlin and is transmitting data over the internet to the Physics lab. The data will be soon be displayed in real time on the web as well as on the flat screen display in the science center.

In April of 2006 an engineer had finished reviewing and stamping the official tower drawings. Since then we have received approval from the state of Ohio to raise the monitoring tower and it will likely go up on June 5th. The monitoring station, powered by two 60-watt solar panels, will transmit data wirelessly over the internet and will not require any outside electricity. We were able to purchase the solar panels and wireless internet equipment with a $2,500 grant from the New Russia Township Board of Trustees.

After several months of data are collected we will draft a business model that will predict power output from several potential Oberlin sited turbines as well as outline the investment required to build them. Even if wind power turns out not to be economically viable in Oberlin currently, it may be in the near future as electricity prices continue to rise. These data and reports will provide an exact price at which it will become cheaper for Oberlin residents to purchase electricity from nearby wind turbines as opposed to the grid.

Gorn Prize Recipients

The Environmental Studies Program Committee is pleased to announce that seniors Daisy Allen, Meredith Dowling, Gavin Platt, and Apostol Dyankov share the Joyce Gorn Prize for 2006. The Gorn Prize was established as a memorial to Joyce Gorn, Oberlin College graduate of 1973, who had been active in environmental pursuits at Oberlin and Cornell University where she attended graduate school prior to her death from cancer in December of 1978. The fund was established by her parents and friends to recognize meritorious work in projects related to Environmental Studies.

Daisy Allen has fulfilled a range of extracurricular responsibilities with respect to environmental issues in Oberlin. She has worked with the Youth Energy Squad to weatherize low-income housing in town and she is currently working with the Youth Energy Project, a student group which uses energy issues to augment classes in Oberlin City Schools ranging from math to English to consumer science. Daisy spent one summer aggressively tracking down the outstanding issues with respect to the AJLC's LEED certification, and one summer working with the community to assess the opportunity for adding energy feedback systems in first new homes (through Sustainable Community Associates) and then existing homes. The existing homes project became the subject of her current honors work. In addition, she has been a trusted tour guide for the AJLC for years.

Meredith Dowling has been a key player in the Environmental Policy Implementation Group (EPIG) and various other student environmental initiatives. Meredith has a wealth of ideas to connect folks across campus and the community. A good example has been her proposal to Oberlin Student Cooperative Association (OSCA) aimed at convincing the organization to replace one of its two gasoline-burning trucks with a diesel truck that could run on biodiesel fuel, creating a possible link between OSCA and Biodiesel Oberlin, a local biodiesel supplier run by Oberlin students. Meredith has been a recycling assistant for several semesters helping to link the ENVS program with the facilities operations staff. She designed an educational brochure and activities for the City of Oberlin's recycling program via the Oberlin Design Initiative and spent many hours in the Environmental Studies Information Center as a student monitor.

Apostol Dyankov has contributed to the Environmental Studies Program in a number of ways, most intensively through his work on the Living Machine, where he took the lead in organizing the student operators. Apo has been ever willing to volunteer his time and creative energy towards advancing ecological waste water treatment and towards promoting ecological design in general. Apo has also served as a photographer and tour guide, spending many hours explaining building systems to visitors from around the world and from the local public schools. His tours were often highlighted by custom presentations featuring his color photography tuned to the interests of the visitors.

Gavin Platt has also been a leader of Living Machine operators throughout his time at Oberlin. Gavin has been active in developing various components of the data monitoring and display and dorm resource monitoring systems. He has been instrumental in advancing the college's environmental policy through his work with the Environmental Policy Implementation Group (EPIG). Gavin also played a central role in efforts to bring the car share program to Oberlin. Additionally, he has conducted many tours for AJLC visitors, having a special gift for explaining technology to children.

Blank Research Assistantships

The Blank Research Assistantships fund was established through a generous grant from the Arthur M. Blank Foundation to enable Oberlin students to undertake research and educational opportunities relating to the environment in collaboration with core Environmental Studies Program faculty. Blank Assistantship funds are intended to primarily support research projects involving maintenance of the Adam Joseph Lewis Center, the Living Machine, the data monitoring/display system, and the landscape.

Blank Foundation Research Assistant Fellowships Awarded for Summer 2006

Projects supervised by Kathryn Janda, Assistant Professor of Environmental Studies Community, Conservation, and Real-Time Feedback: Effects of Social Relationships and Socioeconomic Status: Cara Kritikos '07
Worldwide Status of Energy and Environmental Standards for Buildings: Julia Holland '07

Projects supervised by David Benzing, Professor of Biology
AJLC landscape management/design: David Huck '08 and Samantha Mitchell '08

Projects supervised by John E. Petersen, Associate Professor of Environmental Studies
Jones Farm experimental wetland restoration: Jacob Grossman '08
Redesign of the AJLC Campus Resource Monitoring web sites: Gavin Platt '06
Campus Resources Monitoring System manager: Christopher Fry
Dorm resource monitoring/feedback: TBA

Projects supervised by John E. Petersen Associate Professor of Environmental Studies and Brad Masi, Director of the George Jones Farm
Youth Education and Sustainable Agriculture: Aaron Englander '06 and Lee Hislop '07

Blank Foundation Research Assistant Fellowships Awarded for Summer 2005

Projects supervised by Kathryn Janda, Assistant Professor of Environmental Studies
Regional Energy Initiatives: Stephen (Sam) Merrett '05
International Survey of Energy & Green Building Standards: Julia Holland '07
Dynamics of Consumption: Daisy Allen '06
Travel to Solar World Conference: Michael Roth '06

Projects supervised by David Benzing, Professor Biology
AJLC landscape management/design: Andrew deCoriolis '07 and Ella Ornstein '06

Projects supervised by John E. Petersen, Associate Professor of environmental Studies
Jones Farm Wetland Restoration: Kate Weinberger '06
Development of content and real-time display of Living Machine and an interactive touch pad for the lobby display: Gavin Platt '06
Redesign of Living Machine Oxygen Control System: Christopher Fry '06
Redesign of the AJLC web site: Garrett Miller '06

Projects supervised by Brad Masi, Director of the George Jones Farm
Youth Education and Sustainable Agriculture: Aaron Englander'06

Oberlin College
Environmental Studies Program
122 Elm Street
Oberlin, Ohio 44074-1502

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Congratulations 2006 ENVS Major Grads!

May '06 Graduates

Daisy Allen
Jonathan Beckhardt
Shoshannah Bramlett
Joy Cernac
Emily Doubilet
Meredith Dowling
Eli Durmer
Apostol Dyankov
Brandi Eng-Rohrbach
Matthew Fidanque
Dorje Glassman
Desire Herrera
Robin Hok
Evan Keeler-Wolf
Jennifer Kraft
Danielle Levine
Ona Lindauer
Naomi Lipke
Stacey Litner
Zea Luce
Hanni Muerdter
Claire Nelson
Catherine Noll
James Peake
Gavin Platt
Katharine Rankin
Kathleen Redmond
Kathryn Reed
Daniella Risman
Michael Roth
Juliana Ungaro
Trevor Walter
Kate Weinberger
Rachel Weinstein

December '05 Graduates

Rachel Cohn
Shoshana First
Colin Gunn
Ellen Kunz
Evelyn Lane
Lindsay Miller

May '06 Minor Graduates

Anna-Martha Brown
Jonathan Chen
Ella Ornstein
Alexa Schmitz
Katharine Shapiro