CLIMATE PIECES
Climate-Change Research at Bren

Plus …
More Platinum for Bren Hall
Onions to Electricity
Antarctic Event
Greening the Chumash Nation
We begin the academic year with a welcome to our largest MESM class ever, the promise of important environmental developments on the national and international stage, and significant fiscal challenges in California. With climate change front and center at all levels of government, it is impressive to see Bren faculty and students engaged in so many aspects of the issue.

Our faculty’s climate-change-related research ranges from remote-sensing assessments of seasonal snow and modeling of hydrological and vegetation responses, to examinations of habitat fragmentation and species loss and economic assessments of conservation strategies. The first installment of a two-part article about their work (“Climate Pieces”) begins on page 6.

Our graduates are also involved at every level from local to global. Just two examples: Lindsey Taggart (MESM 2008) works at Santa Barbara’s Community Environmental Council, while Nikki Virgilio (MESM 2008) has joined The Nature Conservancy’s Global Climate Change Team.

We also have another star-studded set of visitors scheduled to spend time at the Bren School this year as part of the Zurich Financial Services Distinguished Visitors series on Climate Change (page 7).

Our strategic partners continue to demonstrate the power of innovation; see page 10 for an article on how Gill’s Onions, one of our newest Corporate Partners, is converting organic waste from their onion processing facility to methane, and using the methane to power hydrogen fuel cells. The process enables Gill’s to save more than a million dollars per year in electricity and waste-disposal costs, run a near-zero waste operation, and generate most of their energy needs without utilizing fossil fuels.

I am especially proud of our recent LEED® Platinum certification for existing buildings from the U.S. Green Building Council, making Bren Hall the first building in the country to achieve double Platinum. This represents a true team effort by the occupants of Bren Hall, staff at Bren and UCSB, and the Bren School Sustainability Committee, which was involved with the recertification effort and continues to promote reducing, reusing, and recycling at the school. (See page 3.)

In the face of a serious budget deficit at the state level, the University of California was forced to take significant steps to reduce expenditures. While we hope that the required sacrifices will be temporary, I applaud the Bren School’s staff and faculty for their continued commitment to our important mission.

—John Melack

Bren professor Thomas Dunne returned to Santa Barbara “tremendously impressed” after ten days in Costa Rica as the Professor-in-Residence for the Toyota International Teacher Program.

Begun as part of a $400,000 Toyota gift in 2008, the program supports environmental-science education in public schools by providing teachers with memorable experiences and important knowledge in meaningful settings.

Dunne, who was asked to make earth science relevant to the Costa Rican context and approachable to thirty secondary-school teachers from across the U.S., said he was struck by the participants’ willingness to take on complex information and the program’s ability to make a difference quickly.

“Some of the teachers are on state curriculum boards, and within six weeks one of them had managed to get a new unit into the state curriculum so that every art student in Texas would be exposed to the study of climate change,” he says.

“Toyota is clear that this is an innovative organization. And you have Toyota, selected for their interest in innovation. You have Toyota, an innovative organization that likes to promote innovation. And you have the teachers and Toyota seeing the Bren School as a source for how to teach environmental science in an innovative way.”

Costa Rica Calling

The volcano Mt. Arenal in Costa Rica

“It’s a really good fit for the Bren School,” he adds. “You have teachers who are selected for their interest in innovation. You have Toyota, an innovative organization that likes to promote innovation. And you have the teachers and Toyota seeing the Bren School as a source for how to teach environmental science in an innovative way.”
Still Platinum after all these Years

This past August, Bren Hall became the first building to earn two LEED® Platinum certifications, the highest sustainability rating possible, from the U.S. Green Building Council. Bren Hall was recertified at the Platinum level for Existing Buildings—Operations & Maintenance (LEED EB O&M), seven years after opening its doors as the first laboratory facility to earn Platinum certification for New Construction.

“It was a big achievement to construct Bren Hall as the first LEED Platinum laboratory building, but in some ways that was easier than earning Platinum recertification,” says Bren School acting dean John Melack. “As a new building, much of the work is left to the architects and the contractors, but as an existing building, it is up to us, the occupants, to work with staff and university personnel to maintain the building to the highest standards.”

UCSB Chancellor Henry T. Yang said that the new Platinum rating “raises the bar on our already ambitious campus-wide sustainability efforts.”

Certification for existing buildings is based on operation and maintenance, occupant health, and financial return of the initial investment in sustainability technology and strategies. It therefore serves to test the occupants’ commitment to sustainable operation and the cost-effectiveness of the green investment.

The LEED certification process involved many people working over several months, including Bren engineering facility manager Jeff Kirby; Bren financial and operations coordinator Mike Best; Bren purchasing coordinator Connie Fourqurean; Perrin Pellegrin, former UCSB sustainability coordinator; and Bren alumni Jordan Sager (MESM 2009), now LEED program manager at UCSB Physical Facilities, and Lindsey Taggart (MESM 2008), who works for the Community Environmental Council. For a complete report, go to: http://www.bren.ucsb.edu/news/platinum_eb.htm.

Acting Locally

Sustainability Committee pushes the green envelope

Bren students take pride not only in attending a school that prepares them as future environmental leaders, but also in making a difference in the real world right now. But some students take their commitment to sustainability a step further. Among them are the members of the Bren School Sustainability Committee (BSSC), who engage in a range of activities throughout the year that reflect the group’s stated interest in “creating a more sustainable community at Bren, UCSB, and greater Santa Barbara.”

In the 2008-2009 academic year, BSSC students participated in a variety of events, including Recyclemania, a friendly weeklong environmental competition among colleges and universities. The group also performed one beach or street cleanup in Isla Vista per quarter in a program sponsored by the UCSB Associated Students Coastal Fund. They set up food-scrap collection points at Bren to reduce trash and provide fodder for the Bren worm-composting bins, and they performed the annual Bren Hall waste audit to assess the effectiveness of the Bren recycling program and identify areas for improvement.

BSSC members also attend to the details that make things like the recycling program run better. “This year we had problems with items going into the wrong bins or recyclables going into the trash,” said BSSC chair Gavin Feiger (MESM, 2010). So they worked to address the issue.

BSSC members were also involved in the recently completed LEED recertification process at Bren Hall. (See article above.)

Looking forward, BSSC is planning a campaign to eliminate Styrofoam at food vendors on UCSB, and has begun “Bren Cups,” an effort to provide a reusable cup to all incoming Bren students to carry with them.

To find out more, visit the BSSC website at: www2.bren.ucsb.edu/~bssc/recycling.htm.
Master Works

Every Bren Group project contributes a solution to an environmental problem. The following five projects also led to academic publications.

**Conservation and California Grasslands**

Class of 2006 students Christopher Bersbach, Jesse Fujikawa, Patrick Jantz (now a Bren PhD student), Joseph Kuhn, and Berhard Preusser partnered with environmental consultant John Gelbard and Group Project advisor Frank Davis “to assess how government policies affect the management and conservation of California grasslands, which cover 11 percent of the state. The study appeared as a chapter in the textbook *California Grasslands: Ecology and Management*, published by UC Press in 2007.

**Nanotech Health and Safety Practices**

With support from their advisors, including Bren professor Patricia Holden and then-Bren associate professor Magali Delmas, four students in the class of 2007—Gina Gerritzen, Leia Huang, Keith Killpack, and Maria Mircheva—designed and conducted the first international survey of environmental health and safety practices in the nanotechnology industry. Follow-up work led to the study’s being published in the *Journal of Environmental Science & Technology* in 2008.

**Designing Marine Protected Areas**

Designing a network of marine protected areas (MPAs) for the central coast of California to protect both biodiversity and fishing communities was the challenge for one group in the class of 2006. Allison Chan, Amanda Cundiff, Nadia Gardner, Yvana Hrovat, Lindsay Kircher, and Carissa Klein worked with a range of stakeholders, including their client, the California Department of Fish & Game, and their advisor, Bren associate professor Bruce Kendall, to devise a solution. The research was published in the *Journal of Conservation Biology* in 2008.

**Pharmaceuticals in Wastewater**

Numerous studies have shown that the presence of pharmaceuticals in treated wastewater is a growing threat to aquatic communities. The team of James Kallaos, Kaleena Wheeler, Crispin Wong, and Margaret Zahller (all 2007) conducted surveys to determine practices for disposing of pharmaceuticals in Santa Barbara County. The study, along with an idea for a disposal program funded by a prescription surcharge, ran in the *Journal of Environmental Management* in 2008.

**Life Cycle Assessment (LCA) and Auto Parts Packaging**

Working with their advisor, Bren assistant professor Roland Geyer, Class of 2008 students Michelle Corti, Claire Early, Timothy Kidman, and Wen-Yu Lee conducted an LCA, then created a tool to instantly quantify and assess the environmental impacts of auto-parts packaging systems chosen by their client, Toyota Motor Sales. The study was published in the *Journal of Industrial Ecology* in September 2009.

**Newest Bren Switzer Fellow**

Bren master’s student Randy Turner has been named a 2009 Switzer Environmental Fellow. The awards are presented by the Robert & Patricia Switzer Foundation to graduate students who are considered “emerging environmental leaders” and are “dedicated to positive environmental change in their careers.”

The fellowships carry a $15,000 award and are given only to students in New England and California; twenty awards were presented this year. Turner joins Bren professor Patricia Holden and alumni Daniel Morris (MESM ‘08) and Leslie Abramson (MESM ‘09) among the 450 scholars to have won awards since the fellowships were started in 1986.

After graduating from Humboldt State University with undergraduate degrees in biology and marine zoology, Turner worked in fishery and watershed restoration in Northern California, spent six years as a fish biologist for the U.S. Fish and Wildlife Service, and served on several government bodies.

“This is a true honor that I hope recognizes not what I have accomplished, but what I am capable of,” says Turner.

**Doris Duke Conservation Fellowships Renewed at Bren**

Five Bren master’s students have won prestigious Doris Duke Conservation Fellowships from the Doris Duke Charitable Foundation for 2009-2010. Lindsay Bass, Gavin Feiger, Dana Murray, Dan Ovando, and Sara Solis (all 2010) each receive full tuition for one year plus a $5,000 stipend to cover the cost of a summer internship.

The program provides funding to support five to six students at eight universities and/or institutions within them. Schools are selected for two-year periods, and this is the second period for the Bren School, which receives $5,000 to enhance its career development program.

Fellows are also eligible to compete for a small pool of funding to engage in self-initiated networking and career-development activities. In the past two years, the Fellows hosted a day of well-attended media-related presentations and workshops on new-media technology and techniques for effectively communicating science to journalists.

Bren Professor Frank Davis continues to serve as the school’s representative and Fellowship Advisor, as he has for the previous two years.
In November, representatives from around the world will gather to celebrate the 50th anniversary of the Antarctic Treaty, a landmark agreement that set aside the frozen southern continent to be used forever “exclusively for peaceful purposes” and in the “interest of all mankind.”

From Nov. 30 through Dec. 3, diplomats, scientists, legislators, lawyers, historians, artists, writers, educators, students, and others will convene the “Antarctic Treaty Summit: Science-Policy Interactions in International Governance” in Washington, D.C. They will explore science-policy achievements and precedents that apply to protecting resources and regions that lie beyond national jurisdictions and account for nearly 75 percent of the Earth’s surface area.

Organization of the event has been overseen largely by Bren researcher Paul Berkman, in collaboration with members of an international board. After winning a Fulbright Scholarship in 2007, Berkman traveled to the University of Cambridge in England, where he serves as Chair of the International Board for the Antarctic Treaty Summit.

Bren professor of governance and renowned Arctic expert Oran Young also serves on the international board and will be chairing the plenary session titled “Governing International Spaces: Lessons from Antarctica.” Young and the Aspen Institute also will be co-convening the workshop “Arctic Governance: Drawing Lessons from Antarctica.”

“The point of the summit is for people to think and learn about ways of governing human activity that are quite different from our typical assumptions and may have a lot of relevance not only to the Arctic but to other parts of the world as well,” says Young. “We need to find collaborative ways of resolving conflicts regarding these international global commons.”

Berkman has said that the event “will provide a unique opportunity for international, interdisciplinary, and inclusive discussions to reflect on the accomplishments and lessons of the Antarctic Treaty System during a period when our globally connected society faces many challenges in responding to significant changes in the Earth system.” U.S. Secretary of State Hilary Clinton echoed those thoughts in April, saying, “The genius of the Antarctic Treaty lies in its relevance today...The treaty is a blueprint for the kind of international cooperation needed to address the challenges of the 21st century.”

Twelve nations signed the document in Washington, D.C., on Dec. 1, 1959, with the intention of providing a framework to manage nearly ten percent of the Earth in “the interests of science and the progress of all mankind.” The Antarctic Treaty now includes 47 nations representing nearly two-thirds of world population.

According to the event’s website, the treaty “has evolved into a system covering not just governance but also resource-management issues arising among international organizations having a scientific or technical interest in Antarctica.”

The polar explorer Laurence Gould once famously described the treaty as “indispensable to the world of science...a document unique in history.”

The summit has received endorsements, funding, and support from a variety of organizations around the world, including the International Council of Science/World Meteorological Organization joint committee for the International Polar Year (IPY), the Royal Society, the Smithsonian Institution, The Tinker Foundation, the Prince Albert II of Monaco Foundation, the Marine Mammal Commission, the US-UK Fulbright Commission, the American Geophysical Union, the Aspen Institute, the Arctic Governance Project, the National Science Foundation, and the Bren School. Thirty-two members of the United States House of Representatives are co-sponsoring a resolution to recognize the anniversary.

For a complete agenda and registration options, visit the summit website; the address is: www.atsummit50.aq.
The Cool Part of Climate Change

The snow- and ice-covered regions of the world serve crucial environmental functions, supplying fresh water to 60 percent of the world’s population, influencing ocean currents, and moderating temperatures on Earth by reflecting solar radiation.

"Snow cover is such a critical part of the climate-energy balance because it’s so highly reflective and so transient and can change the albedo [the net amount of solar radiation reflected away from Earth] in large regions very quickly," says Bren associate professor of geo-informatics James Frew, one of several Bren faculty members who conduct research directly related to snow and ice.

Professor Jeff Dozier, the Bren School’s founding dean and an expert on snow hydrology, Earth system science, and remote sensing, has spent years working to improve techniques for the remote-sensing of snow. A longtime mountaineer, Dozier began studying snow hydrology in 1974 to better understand and predict avalanches. That led him to remote-sensing work and, eventually, to one of his current areas of focus—how climate change impacts mountain snowpack and snowmelt.

It is widely agreed upon that climate change, and warming in particular, will affect snowpack by causing changes in both distribution of snowfall and the elevation at which rain turns to snow. Given that, says Dozier, "The question is, how do we both ensure availability of water and also preserve ecosystem services, meet the water demands of existing land use, and so on. It’s not clear that our management structure is up to the task.”

As Frew suggests, snow has long been a reliable stabilizing factor of water management. "It has the advantage of being a reservoir that you don’t have to build and that, like a reservoir manager, stores enough precipitation when there’s a lot of it," he says. "But as more of the precipitation falls as rain instead of snow, it will be as if the reservoir manager is on drugs, letting all the water out when it falls, which is when you don’t want to release it, with the result that it will all be gone when you need it.”

The destabilizing influence of climate change makes it even more important to have precise information about the snowpack. But getting the data is not easy even under ideal circumstances. "Short-term forecasts are not very good," says Dozier. "Twenty percent of the time, you can have a forty-percent error.”

And that is in forecasts for "well instrumented" areas where the snowpack data have been collected. But in a changing climate, says Dozier, "The statistical relationships behind such forecasts may not hold, so the worry is that if we just keep doing what we’re doing, our performance is going to get worse in the future compared to what it is now.” In other words, just when changing precipitation patterns require greater accuracy, runoff forecasts might become less accurate.”

Furthermore, much of the world has little instrumentation for measuring snowpack. "Climate models don’t do very well even in a range like California’s Sierra Nevada, which is comparatively well instrumented and well studied, and these kinds of problems occur over a large part of the Earth, where one billion people live,” says Dozier. "One of the important challenges is to make the measurements to help the climate models do better.”

That’s where the remote sensing research he has been conducting since 2004 comes in.

Snow is measured at stations scattered throughout mountain ranges in North America, but, says Dozier, "For reasons of access and safety, all of those stations are on flat ground. So one prob-
lem is that they don’t necessarily represent the variations of snow that come with topography, and secondly, the highest elevations are generally not sampled very well at all. We have several ideas about how to approach this problem, and they involve remote sensing.”

Currently available remote-sensing technology cannot measure the depth of the snow and probably won’t be able to for another 10 to 15 years, according to Dozier, so he’s working to integrate two current methods to do the job.

The first involves using images that depict surface-area snow coverage, then spatially interpolating the data from ground stations to estimate depth and, thus, the volume, of the snow. In the second approach, two images are compared, one with snow cover and one after the snow has disappeared. From there, it is possible to calculate how much energy it took to melt the snow and, therefore, to reconstruct the amount of snow in the earlier image. “I know when there was snow and I know the date it goes away and I can back-calculate,” says Dozier, adding that he expects to complete the job of integrating the two processes in another two to three years.

Frew, an expert in the emerging field of geo-informatics, describes his role in the snowpack work as “having all the ducks in a row to do this—making sure we have data feeds from NASA and whoever else we’re getting data from, setting up processing systems to handle the information efficiently, and so on.”

While getting the images is important, ensuring their accuracy is perhaps more so. Satellite instruments sometimes malfunction or fall out of calibration, and the resulting images can throw a model off. Much of Frew’s time is taken up with engineering computer systems that allow for tracing the provenance of single images so that if something goes wrong, there’s a trail back to when it happened.

“The data sets that are built up to create models are highly composite phenomena, and a lot of processing goes into them,” he explains. “So when you look at one of these models, you say, ‘Do I believe this?’ Up until now the answer has been pretty much, ‘Well, so and so did this so I believe it or X did it and I don’t believe it.’ It has to do with your faith in the person who put the model together. And even that person might not be able to say definitively, ‘OK, on these days we used data from this satellite, on these days we used data from that satellite, at this point we made a tweak to our interpretation algorithm so it behaves better,’ so all the different decisions and changes that went into producing this data are lost.

“What I’m trying to do is build environments where that kind of information gets tracked automatically so you can point to something and say, ‘This came from here, which came from here, which came from here, and so on.’ I want to be able to put it in front of someone’s eyes so that they can see it and follow the stack of information as far back as it goes.”

**The Local Watershed**

While Dozier and Frew’s climate work focuses on high-mountain snowpack, Bren assistant professor Christina Tague investigates how climate change might alter the ways that landscapes function as living entities in areas watered by snowpack.

As a principal investigator on a long-term National Science Foundation-funded project to study the interactions among water, ecosystems, and soils—often referred to collectively as the “critical zone”—Tague examines how changes in snowmelt resulting from climate-change-induced warming will alter biogeochemical cycling, vegetation-related

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**2009-2010 Climate-Change Speaker Series**

The second year of the Zurich Distinguished Visitors Series on Climate Change will feature the following prominent visitors, who will be involved in a range of activities during their stays at the Bren School. Further information, including topics, dates, and times of public events, will be distributed and posted on the Bren School website as they become available.

**Lynn Scarlett (fall 2009)** served as Deputy Secretary of the U.S. Department of the Interior under President George W. Bush. Her current activities include working as an independent environmental consultant addressing climate and ecosystem-services issues for the Environmental Defense Fund, serving on a National Commission on Climate and Tropi-
processes, and water quality and quantity.

“One of the things we’re concerned about in California is that, under warming, less snow will fall and snow will melt earlier in the year,” she says. “Consequently, droughts will be more likely in many mountain environments in the West, and drought can have big effects on water in streams and water used by vegetation.”

She explains that changes in snow accumulation and melt may change the percentage of total water that forests and other plants use, altering water availability in streams. Changes in snow can also lead to increased water stress in forests and raise the risk of tree mortality, disease, and fire.

“Ultimately, the people, plants, animals, and aquatic systems that use water are all vulnerable to how warming alters water availability,” Tague says. “What is perhaps less well understood is how the responses of plants, people, and the physical environment interact and influence each other.”

The main tools of Tague’s investigations are intensive field measurements and a GIS-based modeling framework that integrates field data to simulate carbon, water, and nutrient fluxes and model how various processes are distributed and how they interact within a watershed. The data is gathered primarily by a multidisciplinary corps of scientists who, like Tague, are involved in the Critical Zone Observatory Network, a group of three U.S. observatories that provide long-term monitoring of watershed-scale earth-surface processes and their interactions with hydrology and ecology.

NSF’s critical-zone observatories take all kinds of measurements. The idea, says Tague, is that “by putting together a range of data covering such things as soil, carbon cycling, and snow hydrology, we can understand how processes interact and get a handle on the dynamics involved. If we understand how an environment works, we can figure out how one place will respond differently than another.

“There is a lot of concern about global warming, but what I study is more like local warming,” she says. “I try to see how different places in mountain environments will respond differently to climate change, so if you manage a little part of a watershed, what’s it going to look like for you?”

Her work allows managers to tailor their efforts to specific ecosystems or subsystems. “The information is useful because if landscapes change, then objectives currently being met by existing conservation strategies might no longer be met, and you may have to alter what you’re doing. The conditions that create vulnerability are not the same everywhere.”

**VANISHING ICE, EMERGING GOVERNANCE**

While disrupted patterns of snowfall and snowmelt are a concern in snow-dependent watersheds around the world, melting sea ice in Earth’s polar regions introduces an array of other new challenges. Bren professor Oran Young brings a particular focus to issues of governance that will arise as the Arctic thaws.

Young served as the founding chair of the Committee on the Human Dimensions of Global Change within the U.S. National Academy of Sciences, formed in 1989 to help guide domestic research on the interactions between human activity and global environmental change. Today, he is chair of the International Human Dimensions Programme on Global Environmental Change, the research program dealing with such matters on a global scale.

In his own research, he addresses the socio-economic science of climate, energy, and sustainability.

“We ask, ‘How will the impacts of climate change affect human welfare, how can we adapt to significant changes, and what steps can be taken to address the problem?’” he says. As a result, “We’re paying ever more attention to communicating research findings to the policy world.”

The Arctic, where Young has 35 years of experience, is one area where science and policy are converging rapidly. “The relevant concern in the Arctic is not that climate change is a future possibility but that it is a reality now,” he says. “The region is experiencing major changes that are clearly and undeniably linked to climate change, and we have begun to see the impacts on human communities. The sense people in the Arctic have is that they are the canary in the coal mine and that, while it’s useful to have a canary, it’s not so comfortable being a canary.”

With ice-free summers in large parts of the Arctic Ocean likely within the next decade, Young describes as ironic the fact that “the impacts of climate change are opening opportunities that many see as an economic boon: oil and gas development, tourism, fishing, and shipping.”

Young is keenly interested in the mechanisms of governance that the international community will create to preserve the environmental integrity of the region and prevent a potentially destructive free-for-all to exploit newly available resources. To that end, he leads the Arctic Governance Project, an initiative supported by a consortium of funders interested in designing improved governance systems in a rapidly changing Arctic.

“We’re trying to think through the issues of governance as they come into focus,” he says. “It’s an adaptive effort. The point of departure is the physical evidence, which is more dramatic and compelling every year. We want to know what are the consequences and how we can deal with them in a way that serves the interest of the whole Arctic rather than promoting the agen-
da of any one stakeholder.”

Habitat Loss

As a specialist in conservation management, particularly as it relates to habitat protection for plant and wildlife species, Bren professor and noted landscape ecologist Frank Davis encounters climate change as a complicating factor in virtually every project he takes on.

“The biggest challenge for conservation planning in the twenty-first century is how to address climate change in what we protect, where we protect it, and how we protect it,” he says.

In southern Florida, for instance, climate change wasn’t considered seriously when a federally funded project to restore a portion of the Everglades began nearly ten years ago, but it may now necessitate changes to the restoration strategy. “Sea level rise will more quickly, and evaporation and the intensity of rainfall events in southern Florida are expected to change during this century,” Davis says. “These effects of climate change are forcing project planners to re-examine the design and management of Everglades restoration projects.”

On the other side of the country, California is seeking to boost biofuel production to reduce greenhouse gas emissions, and Davis is working with Bren researcher David Stoms, Ph.D. student Theresa Nogeire, and farm economists at UC Davis to determine how various biofuels policies might change cropping practices and how those practices might affect wildlife. “It’s a climate-change-motivated project that makes a direct connection between changes in agricultural landscapes and changes in wildlife populations,” Davis says.

Davis and Bren adjunct faculty member and Conservation International (CI) senior scientist Lee Hannah have partnered since 2005 on a project that involves modeling the future distribution of California plant species under various climate-change scenarios for the 2008 state climate-change assessment. Funded by the California Energy Commission and including colleagues in Australia and South Africa and other UC campuses, the highly collaborative project brings together statistical modeling and simulation models, Davis says, “to try to portray how plant species might move and adjust their distributions as climate changes, and how that might, in turn, affect patterns of plant diversity across California,” which CI has designated a global “hot spot” for plant diversity.

Hannah, who describes his niche as “designing conservation strategies that can cope with the expected biological changes” identified by scientists like Davis, describes the CEC project as an “international effort that produced a model for estimating whether a species can occupy newly suitable climate range, as well as where potentially suitable range is.” He adds, “Through this collaboration we are able to link cutting-edge university research to an NGO’s on-the-ground implementing capacity.”

Two major messages have developed from the work so far. One is that projected redistribution of climate will force plants to redistribute themselves. “These are often fairly major changes, so that plants that now occur in one area might be better suited to completely new ranges,” he says. “But the ability of plants to move into those new suitable areas has been impacted by habitat fragmentation.”

It is a catch-22 common to anthropogenic climate change around the world: development increases planetary carbon emissions, leading to climate change, which forces species to migrate. But many of the migratory pathways have disappeared because of development, isolating species in areas that may become increasingly inhospitable.

The other major finding, says Davis, is that “The climate is changing rapidly, so plants need to move quickly to keep up. This tends to favor some species over others, particularly those that are more mobile and can establish more easily, and they tend to be weedy. So the combination of invasive weeds and habitat fragmentation has really compounded the problem of how plants respond to climate change.”

Davis and Hannah are paying particular attention to the preservation of California endemic species. “We’re focusing attention on those, but the conservation options in California are limited because of habitat fragmentation.” He suggests new forms of management may be needed, whether it’s fire or weed control, or even “assisted migration,” which refers to literally transplanting stock in cases where a species is unlikely to be able to disperse because the new places where it could establish are too far away.

In the policy arena, Davis thinks a lot about the profound consequences that climate change will have on the viability of how the Endangered Species Act (ESA) is currently used. “When a species is declared endangered under the ESA, government bodies establish recovery plans and protect the places where the species occurs,” he says. “That already requires a lot of resources to protect rare, fragmented populations in currently designated reserves, but given the change to habitats projected under climate change, we need to consider larger areas and even places where the species has not occurred in the recent past.”

“Right now we invest a lot of our man-
Steve Gill embodies the common sense, modest bearing, traditional values, and salt-of-the-earth essence one might expect from a fourth-generation farmer whose great grandfather first put plow to fertile Oxnard soil way back in 1880. But while the 59-year-old owner-partner of family-run Gills Onions, one of the Bren School’s newest Corporate Partners, is a farmer firmly rooted in tradition, he is also an innovative entrepreneur unafraid of blazing trails into a low-carbon future. Exhibit A is the waste-powered fuel-cell system recently put into service at the Gills Onions processing facility in Oxnard.

For 25 years, on their way to becoming the nation’s largest fresh-onion processor, the Gills were concerned about waste. “Ever since I peeled my first onion, I knew I had a problem,” Steve says. They used to deal with it by tilling the skins back into the fields, but the fields can’t handle the 300,000 pounds of skins Gills now generates per day. Further, methane is produced as the skins decompose, contamination of soil and groundwater is possible, and hauling the waste to distant fields is costly. All of which led the Gills to wonder if that problematic waste could somehow be used to generate energy. “Converting it into electricity seemed natural,” says Steve. Then they found out about fuel cells four years ago, and they were on their way. In July, after a complex nationwide collaboration that left Steve wondering at times if it would ever be completed, the system was switched on and waste-generated electricity began to flow.

Now those 300,000 pounds of skins are stripped away and used to power two virtu-ally-pressurized, dehumidified, and compressed. Next, the hydrogen atoms are piped to a 145,000-gallon fermentation tank, where bacteria convert the carbohydrates to methane gas, which is then purified, and annual savings of $700,000 on electricity costs and another $400,000 associated with costs for land application of onion waste, Steve expects the AERS to pay for itself within six years.

“We started with a waste-to-energy project and ended up with a money machine,” he says with genuine surprise.

Now Gills is looking at ways to reduce its water usage, add a “flow” battery that will allow electricity to be stored for use during peak hours, extract beneficial polyphenols from the waste to be used as antioxidant supplements for humans, and possibly develop a consulting service for other companies interested in building fuel-cell facilities. Gills is also hosting a Bren Group Project in which four students from the class of 2010 are developing a zero-waste strategy for the company as part of a master strategy for reducing its carbon footprint.

“They’re a great group,” Steve says, referring to LeeAnne French, Laura Hamman, Stacy Katz, and Yuji Kozaki. “We originally thought we needed an intern, but after talking with people at the Bren School, we submitted a project, which keeps growing. Universities have a lot of new-thinking young people, and I always like to be exposed to that. I don’t ever want to do something a certain way just because we always have.”

“We began by wanting to refine our recycling program,” says Steve’s daughter, Nikki Rodoni, the company’s sustainability coordinator. “Now we have this stellar group with diverse backgrounds working with so much energy and enthusiasm. And we have the most welcoming feeling from Bren. The corporate partnership is a great fit for us, and we can’t say enough good things about it.”

Despite receiving a good deal of media attention and notice from Governor Schwarzenegger for the fuel cell, Steve doesn’t see himself as some kind of visionary technofarmer. He’s just a guy who wants to stay profitable while maintaining his land, doing profitably while maintaining his land, doing himself as some kind of visionary techno-farmer for the fuel cell, Steve doesn’t see himself as some kind of visionary technofarmer. He’s just a guy who wants to stay profitable while maintaining his land, doing right by his employees, and protecting the environment for the long term.

“With AB 32 and everything coming down the pike, looking at our carbon footprint is just smart business,” he says in the guise of innovator. As the great-grandson of a pioneering Oxnard farmer, he sometimes phrases it differently, with the dirt-simple words passed down from his mother: “Waste not, want not.”
Real Estate: A Profitable Strategy for Planned Giving

In this challenging time for individuals who are committed to supporting the Bren School’s mission, real estate is one asset that can enable donors to continue their philanthropic giving while realizing substantial tax benefits and/or generating personal income for years to come.

Several real estate-based options are available. Among them is a “bargain sale,” in which a real estate asset is sold at a discount to the UC Regents or UC Santa Barbara Foundation. The sale price, either a lump sum or an annuity, provides quarterly income to the donor or designated beneficiary for the rest of his or her life. The tax-deductible gift is the difference between the fair market value of the asset and the “bargain sale” price.

This is a particularly appealing arrangement for those who may be living alone in a large “empty nest” house and would like to move to a smaller residence that requires less maintenance and overhead. If the donor chooses the annuity option, the remaining funds in the annuity at end of life will benefit the Bren School.

Other giving and planning choices include donating appreciated real estate, and giving a fractional interest in a property, thus making a gift of real estate while retaining possession of it. Each option has specific benefits that may make it right for a particular donor.

For more information about these and other planned-giving opportunities, please contact Jennifer Purcell Deacon, Bren School Assistant Dean of Development, at 805-893-5743, or send e-mail to jennifer@bren.ucsb.edu.

Nanotechnology, Jesusita Fire Compete for Attention at Corporate Summit

The Jesusita Fire lay fairly low for the start of the 2009 Bren School Corporate Partners Summit, which was held May 7-8 under the theme “Environmental Applications and Implications of Nanomaterials.”

The Summit began on a different topic Thursday afternoon when John Herrick, chief counsel for Brownstein Hyatt Farber and Shrek, spoke about the federal economic stimulus plan as it relates to funding projects on renewables. The traditional reception followed in the Bren Hall courtyard, where Class of 2009 students interacted with Corporate Partners while offering poster presentations of their Group Projects.

The fire flared up overnight, but despite searing heat and ash-filled skies, a corps of committed partners converged next morning for presentations on nanotechnology and the environment by Bren professor Patricia Holden, principal investigator for an Integrated Research Unit with the University of California Center for the Environmental Implications of Nanotechnology (UC CEIN); Paul Smokler, vice president of AECOM Environment, which is collaborating with UCSB on a new Sustainable Real Estate: A Profitable Strategy for Planned Giving

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Partners in Nanotech Sustainability

Bren School Corporate Partner AECOM Environment is collaborating with UCSB and the Bren School on a new Sustainable Nanotechnology Initiative (SNI). New nanotechnology-related products enter the market daily, but little is known about the potential environmental effects of nanoparticles. SNI is intended to make progress in understanding the risks associated with engineered nanomaterials.

AECOM’s Environmental Toxicology Lab and risk assessment group is working with scientists at UCSB, including at the Bren School, to study nanomaterial fate and transport, assist in exposure assessment and risk quantification and modeling, develop outreach programs and related training materials for use by industry involved in handling nanomaterials, and conduct real-world testing of methods and instrumentation for the detection and characterization of nanomaterials.

“New nanotechnology-related products are already impacting global industry and society, and SNI is critical to helping industry and the public understand the health and environmental implications of nanomaterials,” said Robert Weber, AECOM Environment Group Chief Executive and a member of the Bren School Advisory Board. “Our collaboration provides another platform to share expertise, and positions us to better assist our clients in addressing issues associated with some nanomaterials.”
New Corporate Partnerships

The following entities are the newest Bren Corporate Partners, joining the school in seeking to integrate sound business practices and environmental sustainability while providing opportunities for Bren students and graduates.

E2

E2 is a national community of individual business leaders who advocate for good environmental policy while building economic prosperity. Working with the Natural Resources Defense Council, E2 takes a reasoned, economically sound approach to environmental issues. The group relies on fact-based policy expertise and bipartisan efforts to deliver results at the state and national levels. E2 was instrumental in the passage of California’s landmark Global Warming Solutions Act (AB32) and is currently working to pass national climate and energy legislation and a federal ocean resources management bill.

Environmental Entrepreneurs (E2)

Trifecta Global Infrastructure Solutions Ltd.

The New Zealand-based startup company is building a powerful suite of truly geospatial, browser-based software tools for infrastructure asset management. Trifecta’s software modules give engineers powerful, intuitive, time-saving tools for managing assets, projects, business processes, and associated resources and budgets across time and space. The solutions can be used for managing not only traditional infrastructure assets but also parks, forests, and any other spatially diverse project and its associated budgets and resources.

For a complete list of Bren School Corporate Partners and/or more information about the Corporate Partners Program, please visit us on the Web at www.bren.ucsb.edu/supporting/corporate_giving.html

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Despite a weak economy and rising unemployment, the job outlook for Bren graduates remains excellent. More than 60 percent of the class of 2009 accepted job offers prior to graduation—an increase over four of the past five classes—and many of those students received multiple offers.

“These results, particularly in a weak economy, demonstrate the ever-increasing value of a Bren degree,” says Dave Parker, director of Bren School Career Development and Alumni Relations. “Our role is to help students learn to package and market themselves” he says. “They might have the best education in the world, but if they can’t sell themselves, they will not be able to land the best jobs.”

Parker sees several factors as contributing to Bren students’ job-seeking success. One is the combination of the high-quality Bren School education provided by the faculty and strong job-search skills gained with guidance from the Career Development team. “Bren students are talented when they arrive, and by the time they leave they are well trained and polished,” he says. “They interview extremely well and stand out during the job-search process.”

Focusing on the strongest job-market sectors and niches is another important element. By tracking expenditures of federal stimulus money, infrastructure funding, and current market trends, Parker was able to highlight where the greatest opportunities would lie: the federal government, consulting firms, energy-related programs and companies, and such specialty niches as life-cycle assessment and geographic information systems, both strengths of the Bren School.

A third element is the interdisciplinary training Bren students receive, which enables them to confidently assume a variety of positions and adapt to a changing job market. While more narrowly focused programs tend to prepare students for short-term marketability in a single area, Bren graduates have the versatility required for long-term success.

Finally, says Parker, Bren students benefit from the strong Bren network. Students share contacts and job leads with each other; faculty members, Dean’s Council members, Advisory Board members, and others in the Bren community provide students with employment contacts and job listings; and Bren alumni and corporate partners hire students and graduates.

“The tight Bren School community and the strong alumni network have had a tremendous impact on the positive placement results,” says Parker.
**Alumni News**

**2000**
After five years as an environmental insurance underwriter, Joy Brown (MESM) is now working as the Environmental Compliance Specialist for the City of Berkeley, where she resides with her husband, Sam Tabibnia, whom she married this past February.

**2004**
Andrea (Chadden) Berkley (MESM) celebrated the arrival of her daughter, Elowah (“Ellie”) June Berkley, earlier this year. Ellie was named after Elowah Falls in the Columbia River Gorge, and June Lake in the Sierra Nevada. Andrea is the Conservation Coordinator for Columbia Land Trust, where she performs stewardship and restoration projects on conserved lands. Her spouse, Chad Berkley, is a software engineer for UCSB’s National Center for Ecological Analysis and Synthesis. The family lives in Portland, Oregon.

Helene Marsh (MESM) is building one of the first LEED-H Platinum-certified custom homes in Northern California. “Tiburon Bay House,” which overlooks San Francisco Bay, is intended to far surpass the number of points required to achieve a LEED Platinum rating. “This will be our home,” says Helene, “but I look forward to using it as a showcase for green building.” Find out more at the website: http://www.tiburonbayhouse.com/TBH/Home.html.

Luke Montague (MESM) married Marsha Mueller, an ER physician’s assistant from Upland, California, at a Sept. 6 wedding on Coronado Island in San Diego. Luke is currently a project manager and general manager for the Ford Mance Company, where he works in in mixed use and redevelopment in San Diego. He and Marsha became engaged in June, during a trip to Mexico’s protected Islas De Marrias islands.

Kristine (Herrington) Wall (MESM), who has worked for the National Oceanic and Atmospheric Administration (NOAA) Office of Ocean and Coastal Resource Management since 2004, was recently relocated to NOAA’s office in Portland, Oregon, to serve as a coastal management specialist for the Pacific Northwest region. Kris works closely with state and local governments in Oregon and Washington on an array of coastal-management issues, supports regional coordination on coastal issues, and oversees a coastal-land acquisition program throughout the west coast.

Last March, after three years as a staff research associate for University of California Cooperative Extension, where she worked on state grants improving agricultural water quality, Dale Zurawski (MESM) accepted a new position as water-quality program manager for the Farm Bureau of Ventura County. She now provides day-to-day oversight and coordination of all Farm Bureau activities related to water-quality regulations and policies, and she represents agriculture as a stakeholder in issues related to water supply and demand.

**2005**
Theresa Lancy (MESM) purchased a home in Ventura this past July and now uses public transportation for her commute to Santa Barbara, where she continues to work for the city in the areas of water conservation and water-supply planning. She also became engaged to Brian Yack this past Valentine’s Day; the wedding is slated for summer 2010.

Karen (Wolowicz) Weiss (MESM) was married to Jeremy Weiss in San Francisco on May 30 and wants classmates to know that she has adopted “Weiss” as her last name. She continues to work at the San Francisco Bay Conservation and Development Commission.

**2006**
Yvana Hrovat and Joe Kuhn (both MESM) were married in La Jolla, California, in July 2008. Yvana, an environmental engineer at EDAW AECOM in San Diego, recently co-authored a paper titled “Water Sensitive Urban Design: An Emerging Model In Sustainable Design and Comprehensive Water Cycle Management,” to be published in the *Journal of the National Association of Environmental Professionals*. Joe is the stormwater program manager for the City of La Mesa.

**2007**
Bliss Dennen (MESM) was recognized by Ford Motor Company as a “Top 100 Web Influencer, Video Storyteller, and Adventurer.” As one of Ford’s Fiesta Agents, she received a free 2011 Ford Fiesta, which she uses to go on monthly missions, the most recent of which was building a home with Habitat for Humanity. After a two-week Greek vacation in September, Bliss was planning to hop into her car and drive to Cincinnati to begin her new job assignment with Procter & Gamble.

Karen Elizabeth Setty (MESM) was married to Fabio Bolognesi on July 23 at the Old Orange County Courthouse in Orange County, California. Karen earned her Bren master’s with a specialization in Water Resources Management and is currently working at the Southern California Coastal Water Research Project in Costa Mesa.

**2008**
“After graduating, Nikki Virgilio relocated to Arlington, Virginia, where she is now a forest carbon specialist with The Nature Conservancy’s Global Climate Change Team, working to incorporate lessons learned from TNC’s worldwide portfolio of Forest Carbon Pilot Projects into the domestic and international policy-making processes. She has been a contributing author on two forest-carbon-related research papers submitted to the United Nations Framework Convention on Climate Change, and she authored a report titled “Forest Carbon Strategies in Climate Change Mitigation: Confronting Challenges Through on the Ground Experience.” Next up is a trip to Bolivia, site of TNC’s Noel Kempff Mercado Climate Action Project.”

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Josh Simmons (MESM 2008) might have become a broadcast football analyst. But a visit to ESPN studios during a high-school internship class led him on a path away from talking about impact players to becoming one himself as the manager of the environmental office for the Santa Ynez band of Chumash Indians.

On that tour of ESPN, Simmons realized what it would take—in terms of effort and luck—even to get a shot at the broadcast booth. He didn’t mind the effort, as evidenced by the fact that he would later hold down 20-hour-a-week jobs both in law school and as a Bren master’s student; it was knowing that effort and luck would have equal weight in the outcome.

Asked back at high school what else he was interested in, he mentioned environmental studies and marine biology, which led to an internship with the environmental office of the Mohegan tribe in Connecticut. It was a one-man office run by Dr. Norman Richards, who Simmons describes as “a genius who was a pioneer in his field and had free rein to do the projects he wanted to do for the tribe.”

Simmons was inspired by Richards’s work and the simple yet elegant solutions he came up with for greening the operation. “From that point on my career was determined,” Simmons says. “Even before college I knew that I would get a bachelor’s in environmental science, go to law school and study environmental law, and then get a master’s in environmental management.”

In law school he wrote a paper about Native American environmental law, when he came to Bren his personal theme had to do with developing a blueprint for environmental management for Indian tribes, and when he had to assess an organization’s environmental program for a Bren class, he chose the Chumash. That led to an internship with the tribe, and then to his current job, which he took in 2008. Since then, he has found opportunities everywhere, both on the 137-acre Chumash reservation and through working with other Indian tribes throughout the United States.

“We serve as the EPA, the Fish & Wildlife Service, the Department of Energy, and any other environmental agency you can think of, for the Chumash,” he adds. “I’m able to work on any environmental issue the tribe faces, and the concepts I work on aren’t limited to one tribe. They are issues faced by a range of other tribes and other businesses, government agencies, and people at their homes.”

With good access to the Chumash decision makers, whom Simmons describes as “open to innovative ideas that make economic and environmental sense, even if they haven’t been tried before,” he is able to get the green light on any project that he can find money for and articulate within the tribe’s expanding environmental vision.

It’s a vision he has helped to shape after arriving at an office that was virtually unstaffed and quiet since the previous manager, Willie Wyatt, now Simmons’s supervisor, was named tribal administrator and took on new responsibilities that left him no time to manage the environmental office.

“Josh has done a great job,” says Wyatt. “It didn’t take him long to get things figured out. He stepped in and took the reins. He’s been really good at networking with agencies and pooling resources to get funding we need for our environmental programs.”

“When I arrived here we were doing X and Y, but I realized we could be doing A through Z,” Simmons says. “I just saw so many opportunities.”

Since then, Simmons has hired two Bren MESM graduates, Jesse Patterson (2008) as an environmental management specialist and Julie Randall (2009) as a water-quality specialist, while working to expand the scope of the office’s activities and initiatives beyond educational events and a few water-related efforts.

Converting the tribe’s fleet cars to natural-gas power and installing a natural-gas fueling station on the reservation is one opportunity the office, referred to officially as the Santa Ynez Chumash Environmental Office (SYCEO), is investigating. Surface- and groundwater-quality studies are underway. The SYCEO is removing trash and invasive species from spring-fed
Simmons continued from page 15

Zanja de Cota Creek, which runs through the reservation, and plans to restore the area using native and culturally significant plants. Improving waste management, greening the offices, installing solar panels on reservation homes and buildings, becoming more energy efficient—the list of projects and planned projects is long and varied and demands a versatile manager to lead them.

“Bren people are ideal for these types of positions,” Simmons says. “You need somebody who really has a broad base and can handle a wide range of projects, not someone who is too specialized. I know when I need to hire a specialist, and I have the confidence to accurately communicate my needs to specialists.”

One key aspect of his efforts has been publicizing the tribe’s environmental projects and accomplishments, such as sustainability programs at the casino. “When I arrived, the casino facilities managers were already doing some amazing things as a matter of efficiency,” he says. “They had a world-class environmental management program. Their waste management was top-notch. They have a green purchasing program, and they recover their waste oil and sell it to someone who makes biodiesel out of it. They have source separation in the kitchens. Their comingled waste from the casino floor is sorted and recycled to a maximum degree.

“The tribe was doing these great things but nobody knew about them. I saw one of my roles as being a public-relations type of person who could allow others to see what the tribe was doing. Through these efforts, we were able to secure a couple of other grants for pollution prevention and win a 2009 EPA Environmental Achievement Award.”

In the past year, Simmons and the tribe have accomplished a lot “because we have the talent we have,” he says. “We have this great resource at the Bren School. I essentially contacted the Chumash and then used Bren as a resource to tap in to the talent we need to take on these kinds of projects.”

Armed with knowledge and relevant skill sets, Simmons says his faith in the process has paid off. “I ended up falling into exactly the right place at exactly the right time.”