Resilient Coral
Hunter Lenihan’s long-term research in French Polynesia

It Takes a Campus
Collaborating across UCSB

Clean Beaches Brigade
Innovating for cleaner streams and shores

Developing an Advantage
Social skills for aspiring professionals
Dean’s Message

Spring is the busiest time of year at the Bren School, with PhD dissertation defenses, Master’s Project public presentations, Eco-Entrepreneurship competitions, visits from prospective students accepted for the 2014-15 academic year, short courses, speakers, and Commencement crowding the calendar. It’s also when we share with you some of what is taking place in, around, and far beyond Bren Hall. In this issue, that starts with “It Takes a Campus” (P4). Our mission is defined to a great extent by interdisciplinary collaboration, and opportunities for dynamic partnerships are everywhere at UCSB. The article demonstrates just how connected the Bren School is to the wealth of expertise and innovation available at this university.

“Resilient Coral” (P6) continues the theme, describing Professor Hunter Lenihan’s research as part of the interdisciplinary Moorea Coral Reef Long-Term Environmental Research project. Lenihan spends nine weeks on the island every year, diving night and day to monitor coral population dynamics.

Over the past decade, Professor Patricia Holden and her dedicated lab scientists (”Clean Beaches Brigade,” P7) have worked with state and local government, NGOs, and researchers at other institutions to develop new techniques for identifying and tracking the sources of bacteria that contaminate California beaches. It’s collaborative interdisciplinary science conducted very much in the public interest.

Bren graduates who become corporate sustainability officers have to know how to work with various entities within a business to drive environmentally focused behavior. They learn some of that from Professor Matt Potoski in the core course ESM 210, Business and the Environment (P8). To see how those lessons translate in the real world, check out “Brick by Brick” (P15), featuring alumna Jennifer DuBuisson (MESM 2008), who was recently hired as Senior Manager for Environmental Sustainability at LEGO.

Of course, interpersonal skills and polish go a long way in facilitating any kind of collaboration. “Developing an Advantage” (P10) portrays what the ever-innovative Career Development team does to prepare students to handle any situation.

Save the Date: The 2014 Bren School Commencement exercises will be held at 10 a.m. on Friday, June 13 in the Michael J. Connell Memorial Courtyard at Bren Hall.

For more information: www.bren.ucsb.edu/events/commencement_info.htm

Faster Testing for Chemicals and Materials

Bren professors lead a new $5 million collaboration

The global economy is generating new chemicals and materials (C/Ms) at a furious pace, and as a result, an unprecedented gap has opened between the number of new C/Ms and scientists’ ability to understand their potential health and environmental impacts. What’s needed are faster methods of assessing those possible impacts.

Developing such methods is the goal of the Sustainable Chemical Network (SusChemNet). In the new $5 million NSF/EPA-funded collaboration, Bren professors Arturo Keller and Sangwon Suh will work with UCSB chemical engineering professors Susannah Scott and Michael Doherty; UCSB chemistry professor Ram Seshadri; Dave Auston, executive director of the UCSB Institute for Energy Efficiency;
The newest member of the Bren School faculty is Mark Buntaine, a political scientist whose research focuses on the sources of effective environmental policy in developing countries, with an emphasis on the targeting and impact of foreign aid. Buntaine leads a range of international projects that examine allocation practices of aid donors, participation of citizens in environmental policy-making, and the evaluation of environmental projects, among others. He formerly served on the faculty at the College of William & Mary and taught his first class at Bren, Environmental Institutions, during winter quarter 2013. A passionate rock climber, Buntaine lives with his wife, Ryoko Oono, a faculty member in the UCSB Department of Ecology, Evolution and Marine Biology.

Bren professor Christopher Costello has been awarded a funded chair as "Bren Distinguished Professor in Interdisciplinary Problem Solving." The chair, which carries a $300,000 award for academic pursuits, is one of several that Donald Bren included in the gift that enabled construction of Bren Hall. "My goal when the last dollar has been spent is to be able to say that we advanced environmental problem-solving by integrating economics, business, and environmental science," Costello says.

"Economics can be a powerful tool to understand and influence human behavior, but the most effective solutions will come through collaborations across disciplines." Costello, an expert in natural resource economics, was selected for the chair by his fellow Bren faculty members. "I’m thrilled to have been awarded this prestigious award; it’s a tremendous honor," he said.

Casey Hankey was hired last October as the Bren School’s academic programs coordinator. Hankey previously served as student affairs manager and undergraduate advisor for the UCSB Department of Psychological & Brain Sciences and says that her new position at the Bren School allows her to combine her skills and her experience in scheduling and student affairs with “new and exciting work.” In her Bren School role, she oversees scheduling, instructional support, and GauchoSpace; coordinates the Master’s Group Project process; and assists visiting lecturers. Hankey earned her BA in English and comparative literature from Columbia College in New York and completed the Columbia Creative Writing Program. She is also an avid and adventurous cook who makes an excellent chocolate truffle.

Bren alumna Lindsey Kaplan was hired in January as the new Bren School Corporate & Foundation Liaison. A member of the master’s class of 2012, Kaplan specialized in Conservation Planning and pursued a research internship in South Africa’s Kruger National Park while at the Bren School. She worked for Bren professor Patricia Holden’s lab after graduating and considered pursuing a career in research but says, “I felt that I could have a greater impact by raising money to support research.” In her new position, Kaplan works to develop mutually beneficial partnerships with corporations and foundations that share the school’s commitment to sustainable enterprise. When not at Bren Hall, she might be found running, surfing, or volunteering with local wildlife conservation organizations.

News Briefs

Lindsey Kaplan

Casey Hankey

plus a group of industry partners that includes Unilever, Dow Chemical Company, and Raytheon.

"Each day on average, roughly 15,000 new chemicals are registered to the American Chemical Society’s chemicals list. To keep up with that production, we need a creative solution to provide timely information on the environmental performance of those chemicals at an early stage of their design," Suh notes.

“It is certainly a challenge, but we have a team of excellent collaborators from multiple disciplines ready to tackle it.”

The group will create a crowd-based online tool to quickly and easily quantify environmental and health risks of new chemicals over their life cycles and share such information with the rest of the world.

Life-cycle impacts of C/Ms may include exposure to toxic chemicals or materials, which can occur not only during the synthesis, use, and end-of-life stages of a C/M, but also earlier, perhaps, for instance, through groundwater contamination that may occur during the resource-extraction phase.

Further, indirect life-cycle impacts may result from other substances associated with a C/M’s life cycle. According to the project proposal, in a recent study of 99 chemicals, a majority of the life-cycle impacts were caused by substances other than the chemicals themselves.

"While it will be challenging to predict the environmental implications of novel materials, it is exciting to be at the forefront of this research, developing the tools to do so," says Keller.

Once the method and basic data are developed and approved by the network’s industry and academic partners, the tools will be implemented on the web as an open-access platform. The project also calls for developing and implementing K-12 and higher-education instructional materials about the life-cycle impacts of chemicals and materials.
It Takes a Campus

UCSB’s vast resources enable powerful – and essential – cross-campus collaborations

The UC Regents established the Bren School at UC Santa Barbara because they understood that a school founded to pursue solutions to complex environmental problems would require collaboration among scholars and researchers in diverse areas of expertise. They knew, too, that UCSB had evolved in a unique way, with few institutional walls separating departments or scholars. That openness facilitated cross-campus collaboration that remains critical to the Bren School’s success.

“To gather the range of experts needed to solve environmental problems, most institutions have to involve other campuses, and we do that, too,” says Bren School dean, Steve Gaines. “But about a third of the faculty at UCSB conduct research that has something to do with the environment. We have so many opportunities to build strong partnerships right here, and we can do things in a richer way than is possible when people are far from each other and meet only occasionally and communicate electronically.”

Sixteen years after the first students entered the Bren School, the breadth of expertise across UCSB continues to enrich student education and faculty research here, with an ongoing focus on problem-solving.

From the beginning, appointments or affiliations in multiple departments have been the norm for Bren faculty, nearly all of whom have a partial appointment elsewhere, including Political Science, Economics, Geography, Earth Science, Mechanical Engineering, or Ecology, Evolution and Marine Biology (EEMB). In the same way, faculty from Communication, Economics, Sociology, Earth Science, EEMB, and Political Science have affiliated appointments with the Bren School.

Curricular collaborations include the Eco-Entrepreneurship focus, established in 2007 with the Technology Management Program in the College of Engineering. Another focus, in Strategic Environmental Communication and Media, began in 2013 from a collaboration with Bren faculty, the Casey-Wolf Center, and instructors from the UCSB Writing Program.

The current level of collaboration took time to achieve.

“When we first started the school, by necessity, we were quite inward-looking,” recalls founding faculty member John Melack. “We had to develop a MESM program and hire faculty from scratch. We were trying to figure out who we were and what a curriculum looks like. There was no model.”

Since then, Bren faculty have built research and teaching collaborations across campus, and several hold administrative positions in UCSB departments, centers, and programs. Professor Bruce Kendall is associate dean of UCSB Graduate Division, Professor Frank Davis is director of the UCSB National Center for Ecological Analysis and Synthesis (NCEAS), Professor Patricia Holden is director of the UCSB Natural Reserve System, and Associate Professor James Frew is acting associate director of the Earth Research Institute.

Professor Frew also provides expertise in geospatial data handling and cartographic visualization for the Media Arts and Technology program, in collaboration with Computer Science. Project collaborators are developing an immersive inside-out virtual-Earth globe, using UCSB’s AlohSphere immersive visualization/sonification environment.

Four Bren professors play key roles in the multi-campus UC Center for Environmental Implications of Nanotechnology, which is based at UCLA and UCSB and includes scholars from other UCSB departments. It recently received funding for a second five years of research into the potential environmental and health effects of engineered nanoparticles. Bren School faculty are also engaged with the UCLA-based California Nanoscience Institute and the UCSB Center for Nanotechnology and Society. A new collaboration with Chemical Engineering and Materials Science is part of a $5 million project aimed at developing rapid-throughput techniques to enable faster life-cycle assessments of new chemicals and materials. (See page 2.)

Professor Emeritus Charles Kolstad brought an Integrative Graduate Education and Research Traineeship (IGERT) to UCSB that linked the Bren School with the Economics Department, led to a new PhD emphasis in Economics and Environmental Science, and attracted top PhD students. Bren faculty also participate in ConvEne IGERT, a collaboration with the Materials Research Laboratory aimed at providing life-cycle and sustainability perspectives to engineering students specializing in materials science. For several years, Assistant Professor Sarah Anderson has partnered with colleagues in Environmental Studies and Black Studies to present a series of talks and panels on environmental-justice issues. She and Professor Matt Potoski also work with Psychology and Brain Science faculty and several PhD students on the new interdisciplinary Crossroads project.

Bren faculty participate in two NSF Long-Term Ecological Research (LTER) projects, one involving land-ocean interactions and the dynamics of kelp forest communities, and the other a study of the long-term dynamics of a coral reef system. (See page 6.) Several professors are involved in the interdisciplinary Interdepartmental Graduate Program in Marine Science.

“The school has made a big effort to build tangible linkages through academic and research programs,” Professor Melack says. “In the past five years, the vast majority of us on the Bren faculty have had grants with people all over campus.”

As the research agenda expands, the cross-campus collaboration that was essential to establish the Bren School in 1996 is today more important — and broader — than ever.
The Business of the Environment
ESM 210 grounds students in essential concepts, practices, and language

Business contributes greatly to some of society’s most challenging environmental problems, but the scale of business activities means that sustainability actions undertaken by companies large and small can have a tremendous impact in terms of addressing those challenges. If Coca-Cola saves water, it matters. If Citigroup reduces greenhouse gas emissions, it’s significant. If an entire business segment cuts energy use, it makes a difference. Given the important role business plays in environmental sustainability, and as part of the Bren School’s multidisciplinary approach to problem-solving, every Bren master’s student takes ESM 210, “Business and the Environment,” as part of the core curriculum.

Taught by Professor Matt Potoski, the course introduces students to essential business skills and concepts that will allow them to be effective working with — and within — businesses to solve environmental problems. “There are things students need to be able to do themselves, and others that allow them to understand what other people in business are doing so that they can interact with them effectively,” says Potoski. “The course highlights corporate strategies that deliver value to stakeholders while responding to environmental concerns.”

Because Bren students have a wide range of educational and professional backgrounds, Potoski begins by ensuring that the class is grounded in basic concepts and ideas. Activities and projects then require students to develop and deploy those skills. They might be asked to translate a sustainability project into the business decision-making process or convey what the return on that investment might be under different scenarios.

“We want them to understand basic budgeting and finance, so they know how to analyze and talk about what a project is going to cost and the revenue it’s going to generate,” Potoski says.

The course includes a strategy component that includes developing a competitive strategy, identifying competitors, and determining how a company differentiates its products from its competitors’ and what it does well to generate revenue.

Non-market components of business strategy are also covered, including how businesses and NGOs can form mutually rewarding partnerships. “For those partnerships to be successful,” Potoski teaches his students, “a business needs to understand the identity and needs of its NGO partner, and it has to be able to show what the company is doing to improve the environment so that people understand and understand the improvements that result.”

Potoski also covers elements of internal management, including how to bring a project to fruition within a company. “Taking action on behalf of sustainability is rarely a politically strong position, so it’s important to know how to work collaboratively and be able talk with whomever else a sustainability officer might interact with to advance a sustainability idea within a company,” Potoski notes.

The best ideas for sustainability strategies are those that align with a company’s core strength. So, for instance, Potoski explains, “Walmart’s core strength is reducing costs through its supply chain. They’re better at that than anyone else in history. So when they want to be sustainable, they say, ‘OK, let’s reduce costs in our supply chain while also creating a more sustainable supply chain.’”

The course also covers effective marketing messages for selling sustainable products that survive the internal process. “I don’t suspect our students will be designing the ads, but they need to know how to be in the discussion with the marketing people and then work on the design and product-development side to get the right sustainability features to the right customers,” says Potoski. “Our graduates are often in the middle of decisions like these.”

While the course is not an MBA and is not intended to substitute for one, it is presented in a way that is distilled from business school practices and modified to fit the Bren context.

For their final paper, students work in groups, perhaps to analyze a business’s environmental strategy or develop a strategy for a company that doesn’t have one.

“They dissect the strategy using the tools we’ve discussed,” says Potoski. “It’s not only good for exercising skills and tools we’re learning in class, but it’s the best way to prepare for a job interview. If you do this analysis for a random company, you can do it for a company where you will be interviewing, allowing you to have a more serious and advanced conversation with your interviewer. I tell students, ‘The purpose isn’t just to write a ten-page paper; it’s actually to get you the skills to get a job.’”
Resilient Coral

Waves pound it, starfish devour it, nutrient runoff damages it. And still, coral comes back. But is what returns as diverse as what was lost?

Every summer, Professor Hunter Lenihan travels to the vacation island of Moorea, Tahiti’s stunning neighbor, to immerse himself in...work. He, a postdoctoral researcher, and an undergraduate student spend two months diving to track the growth of some 7,600 coral colonies around the island, both within the lagoon and on the ocean-facing reef beyond it.

“It's like the Tour de France of coral ecology every summer,” says Lenihan, an avid cyclist. “We go night and day for nine weeks. We make hundreds of dives, each up to two hours long, in water ranging from five to forty feet deep. It’s nonstop, and we’re always rushing to get it done.”

“It’s a coral demographics and population dynamics study on an unprecedented scale,” says Professor Russ Schmitt.

Schmitt is the principal investigator for the UCSB Moorea Coral Reef Long-Term Environmental Research (MCR LTER), one of 27 LTER projects around the world that are funded by the National Science Foundation to support long-term research on important ecological issues. With earth’s coral reefs in peril — scientists believe that nearly 20 percent of reefs have been lost and another 35 percent are in serious danger of disappearing by 2050 — the Moorea LTER scientists seek to better understand the forces that may determine their fate. Lenihan’s work is part of that effort.

Despite the illusion presented on postcards from places like Moorea, life on a reef is tough, and every so often, entire reef systems are wiped out by forces that may originate with nature, humans, or both. From 2006–2010, a population explosion of the crown of thorns starfish — a coral predator, or corallivore — devastated coral communities on Moorea, and in 2010 the huge Cyclone Oli wiped out the remaining communities on the two exposed sides of the triangular island.

While the cyclone was a force of nature, the crown of thorns population spike may have been linked both to nature — unusually heavy rains — and to humans, via increased nutrient runoff, in part from expanded pineapple farming.

“Humans are modifying the landscape, so more runoff and nutrients enter the near-shore ocean when the crown of thorns larvae are in the water column,” Lenihan notes. “So instead of two or three of them settling in an area of a certain size, hundreds do. And eventually, hundreds of thousands of them show up and kill the corals.”

What happens after such an outbreak varies according to circumstances, but algae often play an additional role in the destruction.

“The paradigm for coral reefs in many places is that we’re modifying the ecosystem so much by overfishing and nutrient loading that when corals die because of storms or crown of thorns, algae take over,” Lenihan explains. “We’ve also removed too many grazing fish that reduce the algae, so the corals can’t recover.”

On Moorea, however, algae have not taken over. The MCR LTER’s research suggests that because most of the fishing in Moorea is done on a subsistence level, the island still has enough grazers — "lawn mowers," Lenihan calls them, primarily in the form of parrotfish, to keep the algae in check.

Yet the coral communities have changed.

“Some types of coral come back faster than others,” Lenihan says, adding that on Moorea, the data suggests that a shift in coral communities has taken place. In that process, structurally complex Acropora corals, which we associate with tropical reefs and are the preferred habitat of many fish species, are replaced by less physically complex and, thus, less habitat-friendly Pocillopora and Porites corals.

“So the questions are, on Moorea, why haven’t the algae taken over after these big disturbances, and why do we see a shift in coral species?” Lenihan says.

Despite the changes in the reef’s coral mix, Lenihan and his LTER colleagues have found corals to be amazingly resilient, returning repeatedly from near-total destruction.

“The process of recovery is sometimes rapid and dramatic,” he says. “The sea floor can go from being barren and pavement-like to supporting thousands of baby corals in only a few months’ time.” (See image on opposite page.)

Lenihan’s research focuses on understanding what drives that resilience and how it differs from place to place. He asks whether, in the face of increasing threats, coral colonies on Moorea and elsewhere are likely to retain their resilience and their ability to support a variety of marine life that is important to human populations.

The Moorea LTER also entails developing methods that can be used to restore branching acroporid corals. After
experiencing with thousands of small juvenile colonies over the past several years, Lenihan has found that coral growth and survival are highest in fast-flowing, turbulent water.

“Water movement increases coral energy uptake by benefitting coral Symbiodinium, the microscopic cells that give coral tissue its color and are also important to their photosynthesis,” he explains. “Turbulence also makes it harder for corallivorous fish to bite and injure coral colonies.”

He explains that corallivory is an important constraint to coral success, and may be increasing in importance as large predatory fish that can control corallivore populations are fished out.

“Understanding how physical processes, like turbulence, can dictate biological interactions, like corallivory, is key to unlocking secrets about coral conservation and restoration,” he says.

Lenihan’s annually gathered data on coral recruitment, growth, and survival are entered into population-dynamics models developed by Bren professor Bruce Kendall and Lenihan’s former student Annie Yau (PhD 2011).

“We’re looking at winners and losers in terms of the population dynamics, and then, given those trends, we’re modeling what the reef community should look like in the future,” says Lenihan. “If we can unlock the secrets of reef resilience, then we can use that knowledge to design effective management and restoration strategies for coral reefs around the world.”

It’s nobody’s favorite part of a day at the beach: reading the official report that lists levels of fecal-indicator bacteria (FIB) found in the surf. Those contaminants can affect fisheries, habitat, recreation, and economies, but they also pose a danger to public health. California law requires agencies that have jurisdiction over coastal waters to test for bacterial contamination weekly and post the results prominently.

While posting advisories at the beach for such undesirables as fecal coliform and enterococcus bacteria enables beach-goers to avoid contaminated water, it does nothing to prevent the contamination in the first place. To do that, agencies need to know precisely what kind of bacteria are present — whether from humans, dogs, birds, cattle, etc. — and how they’re entering the system, whether from animals, septic tanks, sewage lines, or even cross-connected pipes, which result when a sewer line is accidentally connected to a storm drain or when old sewers and drains leak.

For more than a decade, Professor Patricia Holden and her Bren School lab team have been working with city, county, and state agencies, as well as NGOs and researchers from other universities to develop and apply innovative methods for providing such comprehensive information. A $1.25 million gift from Henry H. Wheeler in 2012 has supported that urban water-quality research.

The ability to identify types of bacteria by the animal of origin connects to what Holden calls “the first-order issue”: human waste. “Human bacteria pose a greater health hazard [than animal bacteria] for people swimming in the ocean or playing in the surf zone or even just sitting on the sand,” she says.

Much of the Holden lab’s recent bacterial tracking work was done as part of a statewide collaboration called the Source Identification Protocol Project (SIPP). The state-funded venture ran from 2010–2013, with the objectives of developing scientific protocols for identifying the source of bacterial contamination in creeks and coastal waters and providing recommendations about management practices.
that local communities could then use to remove sources of contamination.

Each of the four teams involved in the project — Holden’s group and one each from Stanford, UCLA, and the Orange County–based Southern California Coastal Water Research Project — identified a local beach that consistently failed to meet standards for fecal indicator bacteria. Sources within the local watersheds were identified and prioritized, and a set of protocols for investigating them was adopted and then tested by each team at its “adopted” beach. Holden’s group worked at Arroyo Burro (Hendry’s) Beach in Santa Barbara.

After a few years of field and lab work, the collaborators created a manual that local, regional, and state agencies can now use to guide bacterial source tracking at their beaches and watersheds. As a result of SIPP, California became the first state in the nation to establish a standardized of SIPP, California became the first state in the nation to establish a standardized protocol for developing and implementing source identification studies.

The Arroyo Burro field work was led by Holden lab postdoctoral researcher Jared Ervin and began with extensive reconnaissance across the beach and throughout the watershed.

“The first thing we do is to work systematically upstream from the contaminated beach to understand the watershed in the context of the creeks, land uses, and the infrastructure, including sanitary sewers, storm drains, and septic systems in the area,” Holden says. “We inform ourselves thoroughly about all the potential contributors and their locations.”

They then designed a field study and spent two summers collecting samples of surface water, groundwater, sand, and wrack — decomposing seaweed — and testing them for contamination. One of the things the research showed was significant levels of FIB in the Arroyo Burro lagoon, which was coming from upstream in the creek. Using DNA-based markers, they were able to determine that the pollution was coming mainly from dogs — apparently from private properties located along the creek.

“It seemed that homeowners were discarding dog waste over the fence, and it would end up in the creek,” Ervin says. The City of Santa Barbara Creeks Division then performed a short-term public education campaign that involved knocking on doors and talking to residents, asking them to be mindful of how they disposed of their pets’ waste. Sampling after that showed a large decrease in dog DNA-based fecal markers.

“If you use the right methods, you can diagnose the problem and then possibly solve it using a low-cost management strategy, thereby reducing health concerns at the beach,” Holden notes. “These tools can be really effective.”

Not every contamination issue calls for expensive lab techniques right away. “Sometimes there’s a need first to survey the environment to understand where to employ the expensive tools,” Holden says.

That’s where another project, led by Holden’s staff research associate Laurie Van De Werfhorst came in. It involved a new use of trained scent dogs to track sewage contamination to its source.

“If you’re trying to understand where the problem regions are within a whole city, walking trained dogs around is not only faster and less expensive than DNA testing, but it’s also a good way to engage the public in the issues,” says Holden.

The dogs, Logan and Sable, were instrumental in solving a puzzle. Holden’s group, in collaboration with the city, had quantified sewage in storm drains but couldn’t locate the source. So the dogs’ handlers guided the dogs to a known problem area. They then worked “upstream” in the storm drain system, checking each manhole. Samples were taken wherever the dogs detected the scent, and lab tests confirmed the presence of sewage. Logan was 100-percent accurate, and Sable was about 70-percent, high compared to other methods, according to Van De Werfhorst.

The highest upstream manhole where the dogs picked up scent was in a shopping center parking lot. A city crew was called to deploy a remotely operated TV camera into the storm drain. The images it sent back showed the physical problem: cracked pipes that could be repaired in hours, alleviating a source of chronic contamination.

“The dogs gave immediate results, while DNA tests can take days, weeks, or even months to complete,” Van De Werfhorst explains. “We can use the dogs to indicate what areas may be contaminated, and then prioritize those areas for detailed analysis, including quantifying the problem.” An article on the project is scheduled to run in the journal Water Environment Research.

In addition to that forthcoming paper, more than nine journal publications have resulted from the larger SIPP bacterial tracking project, leading to a special issue of the journal Water Research, devoted exclusively to testing and assessing the various tools.

“We’ve been able to push the science forward while collaborating with agencies and assisting managers,” Holden says. “It’s a perfect example of new science that can lead to solutions.”
For more than a hundred years, New Mexico’s Santa Fe Municipal Watershed has been managed with zero tolerance for forest fires. As a result, the forest has become overgrown, developing a thick, continuous canopy comprising trees of the same age and making it susceptible to cataclysmic fires, insect infestations, and massive die-off during droughts. The watershed provides almost half the water for the City of Santa Fe, so any changes to the forest have the potential to impact local water supplies.

Land-use managers in the Santa Fe watershed are addressing issues of overgrowth by thinning the forest and returning it to a more natural state, with more open areas and a patchier canopy. Fifth-year Bren School PhD student Aubrey Dugger’s doctoral research involves working with Santa Fe watershed managers and conducting complex modeling research with the intention of not only identifying optimal thinning practices to maximize water yields, but doing so in the context of climate change.

“It’s a lot more complicated than simply reducing the amount of carbon [i.e. trees] on the landscape,” says Dugger. “You have to do it in a strategic way.”

For instance, it seems obvious that when trees are removed, more water will be available, but Dugger explains that opening up the canopy has a complex effect on water cycling. Snowpack and ground surfaces are exposed to more sunlight and wind, potentially leading to earlier snowmelt or more surface evaporation. “You may end up with more water coming out the bottom of the system, but it may be available at a different time of the year, which can affect management decisions in this reservoir-driven system,” she says.

What grows into the newly opened spaces also matters. “If an understory grows back where the trees are removed,” she explains, “it will transpire water [meaning take up water and lose some to evaporation], so you can actually end up with less water downstream.”

Other important considerations include how much space to leave between trees and what to do with the ones that are cut down. Fallen trees can fuel fires, but if left on the landscape, they also shade the soil surface, potentially trapping some water and adding roughness to the terrain so that more water might be held locally.

“There are a lot of variables,” Dugger says. Her research has two main components. She first had to identify which processes — such as radiation balance, canopy and surface evaporation, and plant water use — to model in order to figure out how thinning will impact the water supply. She then had to determine “which features of the landscape — such as slope [steepness], aspect [the direction a slope faces], and soil depth — control whether we get more or less water from the landscape by thinning, what the timing of that water loss or gain will be, and how much more or less we’ll get.”

To accomplish that, she has added some new functionality to the powerful RHESSys watershed model for which her faculty advisor, Associate Professor Naomi Tague, is the chief architect.

“Aubrey made changes that allow her to capture fine-scale processes and their aggregate effects at the watershed scale,” Tague says. “And because her work is embedded in the model, we’ll be able to use it in studies beyond what she’s focusing on.”

Once the model is working optimally, Dugger says, “We’re going to have some general recommendations for the managers. We might say, ‘We think you can maximize water yields by thinning on south-facing slopes that have shallow soils.’”

Preliminary results, however, show that these rules might not hold under a warmer climate. “Under warming scenarios, we no longer see these clear relationships between landscape characteristics and post-thinning water yields,” she adds. “At that point, the climate itself controls the response, so the strategy we choose now might depend on what we expect the future climate to do.”

Dugger will be able to provide Santa Fe watershed managers with trajectories for what their stream-flow response to thinning might be in the future. The model should be useful in other locations, too, such as the Sierra Nevada.

“Basically, we’re taking a GIS model of the landscape — topography, soil, and vegetation — and modeling how water cycling changes after thinning,” she says. “Some of the relationships we come up with will be applicable elsewhere, and that will be our greater scientific contribution.”

A dense, overgrown forest uses water and invites devastating fires.
Interpersonal skills put the polish on aspiring environmental professionals

The old saying about business being built on relationships has never been truer than it is today.

Consider, says Career Development and Alumni Relations Director David Parker, that not so long ago, when people had to type out job applications, resumes, and cover letters and send them by snail mail, “A company was happy if forty or fifty people applied, maybe a hundred for a really good position. Now, you’re competing with thousands of people from around the world. You can be the most qualified candidate on paper, but as one of a thousand applicants, your materials might never be seen.”

Students therefore need other ways to get in the door and get noticed. “They need connections. They need to get in front of people,” Parker says. “We always ask students who are looking for jobs if they’re talking to friends and alumni, and going to events like Green Drinks and AEP [the Association of Environmental Professionals] meetings.”

Success lies in “bringing all of themselves to the job search,” explains Parker, who has been a member of the AEP Board of Directors since 2002 and served as vice president of programs from 2002-2011. “I think that the overall training our students receive gives them an advantage. They speak well, and they do well in front of people. If they’re just sitting at a desk and applying for positions online, they aren’t covering key areas of the job search. More importantly, they’re eliminating their advantage.”

Some of that advantage comes from the school’s emphasis on written and spoken communication, public presentations, and collaborative group work, including Master’s Projects. Parker and his team — Assistant Director of Career Development and Alumni Relations Kristen Robinson and Career Development and Alumni Relations Coordinator Christine Yi — augment that by supporting students in mastering the interpersonal aspects of professional life.

“We want our students to feel comfortable socially,” says Parker. “If they do, then their focus will be on the meeting or conversation that’s taking place, not insecurities about possible faux pas.”

Over the years, employers speaking at the Bren School have often said that writing is the most important skill they look for in prospective employees. In response, the school created a writing center, now expanded to include all types of communication. “We did that to give our graduates a competitive advantage,” says Parker.

Later, it became clear that interpersonal and social skills were also on employers’ radar. “One speaker told us, ‘We want low-maintenance employees whom we can put in any situation and feel comfortable with their ability to handle it,’” Parker recalls.

“We’re working on things that employers have a hard time teaching people,” he says. “They know that Bren graduates have the required knowledge and technical skills and can learn anything they need to know on the job. But what employers can’t teach or don’t want to spend the time teaching are communication and interpersonal skills, abilities that make an employee a polished professional.”

MESM students’ training starts at orientation, with team-building exercises. Early in their first quarter, they attend the “Art of Mingling” workshop, interacting with second-year MESM and PhD students to practice techniques for meeting people, joining and leaving conversations, exchanging business cards, and getting the most out of the interactive opportunities at a reception or a conference. Toward the end of the quarter, the students attend the annual AEP kickoff event, which attracts up to 150 participants, more than half of them environmental professionals. Class presentations, collaborative Master’s Projects, and participation in such professional groups as AEP, Net Impact, and the American Planning Association further develop those skills.

“A lot of career development programs focus on networking, but we take it further by going into the details of the interactions that are inherent to the process. That’s unique,” Parker notes, adding, “By the time they have their degree, our students are able to present themselves the right way, ask the right types of questions, and feel comfortable interacting with many types of people in an array of settings.”

Learning to greet people, identify the correct fork, and hand out business cards can seem pretty rudimentary, Parker says. “We sometimes wonder if it’s too basic, but our master’s and PhD students come from a variety of locations and backgrounds and have varying levels of training and comfort in these areas. We’ve done evaluations and found that they love the training and are happy to get it.”

The Career Development team — (from left) Christine Yi, David Parker, and Kristen Robinson — supports students in developing essential skills.
Support for Sustainable Ocean Solutions

The WAITT Foundation has renewed its generous support of the Sustainable Fisheries Group’s (SFG) Sustainable Ocean Solutions (SOS) project with a grant in the amount of $600,000 in the fourth year of a five-year commitment. The SOS project combines three important tools for ocean sustainability: rights-based management reform, providing fishing communities with an ownership stake in managing fisheries sustainably; marine protected areas, which support recovery of depleted fish stocks; and demand-side incentives, such as labeling and certification programs to encourage consumer behavior that supports sustainable fisheries.

This year’s funding included an additional $100,000 to provide much of the scientific, economic, and technical support for a new project at the Waitt Institute, called the Blue Futures Initiative. It is intended to support comprehensive ocean zoning and sustainable fisheries management for coastal communities, with an initial focus on the Caribbean. A pilot project was already begun, but, says SFG research and program manager, Sarah Lester, “This year’s additional funding will allow us to play a much more prominent role at the next site in the Caribbean.”

The grant will also support SFG’s ongoing work with Fish Forever (a partnership with NGOs Rare and the Environmental Defense Fund), which is currently informing fisheries management and marine spatial planning in the Galápagos and marine spatial planning in Bermuda.

The SOS project furthers the educational opportunities for Bren School students who are involved in such work, offering two to three research assistantships and one to two internship opportunities. The WAITT Foundation first supported SFG in 2011 with a grant of $400,000.

More about the Blue Future Initiative: waittfoundation.org/blue-halo-initiative-barbuda
More about SOS: sfg.msi.ucsb.edu/current-projects/sustainable-ocean-solutions

New Funding for Sustainable Water

The Bren School has received a gift from the Walton Family Foundation that will enable continuation of the Sustainable Water Markets (SWM) Fellowship program. This gift supports Bren School master’s and PhD students who are interested in pursuing careers related to water-markets issues, particularly in the American West. SWM was established in 2012 with an inaugural round of funding; the new gift of $665,000 will fund the program for a second cohort of SWM fellows. To date, the funds have supported six students, associated faculty, and programmatic costs.

“In light of the Colorado River basin’s longstanding drought, short- and long-term policy responses are urgently needed to address issues of water supply, demand, and quality,” says Professor Gary Libecap, one of several SWM faculty coordinators. “The SWM program brings together master’s and PhD students and faculty, providing a mechanism for scholarly interaction and exchange that otherwise might not exist, while facilitating policy-related research that can be conveyed to policy-makers. Interdisciplinary research, a Bren School hallmark, is critical for addressing the major environmental and natural resource issues of the day, but it requires investment, so we are extremely grateful to the Walton Family Foundation for this important gift. The problem of water in the Colorado basin is a long-term one, and SWM provides for long-term investment in the future.”

More about SWM: www.bren.ucsb.edu/academics/water_markets.htm

A Dedicated Donor

The Bren School owes thanks to a corps of supporters who provide important funding for Bren master’s and PhD students. Their gifts enable students to pursue summer internships, take on projects, and bridge budgetary gaps.

Among those committed supporters is Herb Kendall, whose generosity has supported seven students since his first gift in 2007.

As a longtime real estate developer, Mr. Kendall worked to make his planned-unit communities environmentally sound. An equally devoted supporter of the arts, he developed the South Coast Repertory Theater in Orange County and in 1983 created the Santa Monica Arts Commission.

He began supporting the Bren School because it reflected the interest he developed in environmental challenges, especially climate change, during his many years as a builder.

“In my opinion, the most important challenge is climate change,” he says. “In building communities, I learned more about the environment and came to the conclusion that climate change is very real and is caused primarily by humans burning fossil fuels.”

Further, he says, he looks to the Bren School to do big things, and he knows that “The state can’t support every student, so private people like me need to step up and provide the resources.”

Bren School Social Media

FACEBOOK: The Bren School Facebook page includes information you won’t find anywhere else, and is also an easy way to keep up with news and events. If it’s posted on the web, it will be on Facebook. You can access the page by going to Facebook and searching for “UCSB Bren School” or using this url: www.facebook.com/pages/UCSB-Bren-School/137276289632466.

TWITTER: We’re listening to the world via Twitter, in voices that emanate from all over. And we’re tweeting about ideas and insights, science and solutions. Our handle is @brenucsb.

ALL THINGS MEDIA: The Bren website is a remarkable compendium of information about the Bren School and all that goes on here. The “Events & Media” section includes an events calendar, links to YouTube videos, brochures, and PDF files of back issues of Bren News, the official newsletter of the Bren School. Keep up to date at: www.bren.ucsb.edu/news/media_intro.htm.
New Name, Exciting Changes for Partners Program

For years, the Corporate Partners program has been a dynamic component of the Bren School, built upon and expanding collaboration with forward-thinking companies, while providing expert advice, internships, and employment opportunities for Bren students and graduates.

The program is currently undergoing some exciting changes and was recently renamed the Corporate & Foundation Partners Program to recognize the diversity of our participating organizations. The restructured program will also expand opportunities for partners to network with each other and the Bren School to better serve the needs of our partners as well as faculty and students.

The new program features three levels of partnership, Gold (giving level of $10,000+), Silver (giving level of $5,000–$9,999), and Bronze (giving level of $2,500–$4,999; reserved for our government/academic/NGO partners). All levels include membership in the UCSB Chancellor’s Council Gift Recognition Society.

New benefits available to our partners include:

- Access to the Bren School online network
- Bren-hosted web pages, offering corporations and foundations the opportunity to highlight sustainability departments, environmental programs, and their partnership with the Bren School
- Access to university databases and journals
- A new semi-annual e-newsletter for partners

We will continue to host an annual partners’ summit and offer recruiting and internship opportunities to our partners.

For more: [www.bren.ucsb.edu/supporting/corporate_giving.html](http://www.bren.ucsb.edu/supporting/corporate_giving.html)

Recent Donors

The Bren School would like to thank the following for their recent gifts of support.

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- Walton Family Foundation
Celebrating Bren School supporters

1999
Jim Dalton (MESM) received his law degree from the Concord Law School in 2012, was admitted to the California Bar Association in 2013, and now has a solo practice in Los Angeles. He specializes in nonprofit and for-profit business start-ups. He is also an advocate for environmental resiliency and lectures on the subject.

2001
Michael Jennings (PhD) is a research professor in the Department of Geography at the University of Idaho. His recently published work includes “Field notes from the future: Environmental conditions at four localities in 2100,” in the book A World After Climate Change and Culture-Shift (Springer, New York); a solely authored paper titled “Climate disruption: Are we beyond the worst case scenario?” in Global Policy; and the co-authored paper, “Scientific foundations of the IUCN Red List of Ecosystems” in PLoS ONE.

2002
Mark Kram (PhD) served as editor for a new book released by the international standards body ASTM, titled Continuous Soil Gas Measurements: Worst Case Risk Parameters. The book includes Mark’s seminal research paper documenting dynamic vapor intrusion risk conditions and how the earth “breathes” with changes in barometric pressure.

Alex Tuttle (MESM) is dad to a baby boy, Emmett, born December 2013. Alex still lives in Santa Barbara, where he has worked for the County Planning Department since graduating from Bren.

2003
After five years as a law fellow at the Institute for Governance & Sustainable Development, which is headed by Bren visiting lecturer, Durwood Zaelke, Danielle

Fest Grabiel recently accepted a position as a senior wildlife campaigner for the Environmental Investigation Agency. She works on international conservation issues. She and her husband live with their two young daughters on an organic farm in the mountains outside of Portland, Oregon.

2004
Rajendra (Raj) Bose (PhD) began his new role as Director of Research Computing for the Mortimer B. Zuckerman Mind Brain Behavior Institute at Columbia University. Previously, Raj was Manager of Research Computing Services within Columbia’s central Information Technology division. After graduating from Bren in 2004, he was a postdoctoral researcher at the Digital Curation Centre at the University of Edinburgh, and a short-term visiting researcher at the Lamont-Doherty Earth Observatory at Columbia.

Brooke O’Hanley (MESM) was recently married, and she changed her name from Brooke O’Hanley to Brooke Selzer.

2005
Katie DeLeuw (MESM) and Josh Miller (MESM) have a 2½-year-old son, Declan, and now a new daughter, Kiera Mae, born on December 11. Katie just celebrated seven years with EnviroIssues, where she conducts public outreach and stakeholder coordination. Josh continues to work on GIS analysis and stormwater management for PACE Engineering. They live in Seattle.

Tim Olsen (MESM) and his wife, Nicole, welcomed twin sons on November 1, 2013. Edward (left) and Ezra are shown with their 2½-year-old big sister, Elise.
Alumni News

Alumni continued from page 13

2007

After a stop at Oracle in Redwood Shores, California, Bliss Denneh (MESM) has relocated to Portland, where she is working as Global Digital Brand Strategy and Operations Manager at Nike. She works on the same floor as Crispin Wong (2007).

Dan Kaffine (PhD) and his wife, Leah, have a 1½-year-old son, James Thomas Kaffine, who was born September 9, 2012. In fall 2013, Dan was promoted to associate professor of economics, with tenure, at the University of Colorado, Boulder.

Dayna (Yocum) Aragon (MESM) and her husband, Melvin Aragon, had twin girls, Amelia Grace and Eliza Michelle, on November 26, 2013. They moved to Castro Valley, California, in July 2013. Dayna continues to enjoy her work as an environmental scientist and ecological risk assessor at Tetra Tech, Inc. in Oakland.

2008

Jonah Busch (PhD) accepted a position in September 2013 as a research fellow at the Center for Global Development, a think tank in Washington, D.C. He conducts research on and communicates about the economics of tropical deforestation and climate change.

After more than five years at Resources for the Future, Danny Morris (MESM) has a new position at the U.S. Treasury Department, as a policy analyst focusing on international climate finance and negotiations, and domestic climate change initiatives. He was settling into the position at press time, but says his duties include representing the U.S. in the administration of the Climate Investment Funds (a pair of funds that help developing countries pilot low-emissions and climate-resilient development) and other international climate negotiations. He will also support Treasury in implementing a number of aspects of President Obama’s Climate Action Plan.

Lindsey Taggart (MESM) married Ryan Hawes, an electrical engineer with Northrop Grumman, in November 2013. The couple continues “to enjoy the variety and the great food and weather that San Diego offers” from their home in North Park. Lindsey works at the California Center for Sustainable Energy in San Diego.

2010

Carly Wilburton (MESM) married Chris Barham in Buellton, California, on September 28, 2013. The couple lives in Santa Barbara, where Carly has worked for the Santa Barbara County Air Pollution Control District since October 2010.

2011

Jocelyn Gretz (MESM) was promoted to Director of Environmental Science & Resources at Rio Farms. In fall 2013, she was appointed to the Environmental Farming Act Science Advisory Panel at the California Department of Food and Agriculture. In the past two years, Jocelyn has served on the scholarship committee for California Women for Agriculture. She was recently elected to the Board of Directors for Ag Against Hunger, a nonprofit organization that creates connections between the agricultural community and food assistance programs.

2012

Last fall, Dana Jennings and her Bren class co-chair, Karly Kaufman (both MESM), had babies within a couple of weeks of each other. Dana (left, at top of next column) and her husband, Robert Altieri, welcomed Leonardo Altieri on October 4, while Karly (right) and her husband, Russ Fagaly, had their first child, Robert Jeffrey “RJ” Fagaly, on September 16.

In February, Kimberlyn Way (MESM) became an Oak Ridge Institute for Science and Education (ORISE) Fellow for the U.S. Environmental Protection Agency Office of Water, Mississippi River Basin and Gulf of Mexico Hypoxia Task Force. She says she is “excited to be working on large-scale watershed quality management, and to be a part of the remediation effort that addresses such an important watershed quality issue.”

2013

In January, Rebecca Dorsey (MESM) started a new job as a Presidential Management Fellow Foreign Affairs Officer in the U.S. State Department Bureau of Oceans and International Environmental and Scientific Affairs, within the Office of Marine Conservation. She is working on the Oceans and Fisheries Working Group for the Asia Pacific Economic Cooperation (APEC).

Katie Hentrich (MESM) is “very happy to be back in Santa Barbara!” where she has begun working as a planner in the County of Santa Barbara Long Range Planning Division. She had spent the prior six months in San Diego.

Adam Knox (MESM) recently accepted a position with the U.S. Geological Survey on the island of Guam, where he works on a project to remove invasive brown tree snakes, which have devastated islands birds, lizards, and entire ecosystems. He left the U.S. in mid-January.

Ching-Cheng Lin, 1979–2014

It is with tremendous sadness that the Bren School announces the passing of Ching-Cheng (Timothy) Lin (MESM 2013). He died of leukemia in Santa Barbara on February 5, 2014 at the age of 34, leaving behind his mother and father and a younger sister. Ching-Cheng was born in 1979 in Taipei, Taiwan. He attended National Taiwan University in Taipei and arrived at the Bren School in 2011 with a positive attitude, a gentle spirit, and a love of cooking, classical music, football, and baseball. He played violin and had a keen interest in World War II history and aircraft, and China-Taiwan politics.

His specialization was Corporate Environmental Management. The other five collaborators on his Group Project remember him as intelligent, kind, positive and willing to help out in any way he could. “Timothy was so pure,” says Group Project member Daniel Viana. “He taught me to say yes to anything and to see it as an opportunity.” He will be missed by all who knew him.

Read the complete remembrance at www.bren.ucsb.edu/people/alumni/ching_cheng_lin.htm
Justin Lichter (MESM) completed his second book, Ultralight Survival Kit, which was released in mid-February 2014. The book provides information on how to keep your pack ultralight while still being prepared for trail concerns and worst-case-scenarios. It’s available through Amazon, Barnes & Noble, Powell’s Books, and REI.

Jennifer (Miller) DuBuisson builds sustainability at LEGO

Brick by Brick

Last summer, right around the time Jennifer DuBuisson (MESM 2008) accepted the position as Senior Manager for Environmental Sustainability at LEGO, the company was setting out to produce more eco-friendly versions of the in-store point-of-purchase displays for its famous kids’ building bricks. But when the designers finished, they weren’t sure if the new version was better than the old one. Putting her Bren School life cycle assessment (LCA) training to use, DuBuisson and her team ran an LCA for the displays.

“It turned out that the materials chosen were not the most environmentally preferable, so the new display actually had a greater negative impact than the plastic boxes they had been using,” she says.

That successful collaboration with new colleagues from various areas of the company allowed DuBuisson to use her education and her expertise to educate the merchandizing team and suggest alternative materials that led to a more sustainable point-of-purchase display. The bonus, she says, is “It becomes a great example that I can use in talking with sustainability counterparts and our customers to make sure they’re aware of the actions we undertake to meet their expectations.”

Having spent the previous five years as Associate Manager for Global Sustainability at Mattel, DuBuisson has been making the transition from a large publicly traded corporation to the family-owned Danish company. Her work is focused primarily around stakeholder engagement, communication, and strategy development related to environmental sustainability.

In her new position, she focuses on building a broader community and a deeper understanding of responsibility, including the social aspects of sustainability. “Manufacturing issues, ethical performance, and responsible sourcing are significant issues for companies,” she says. “It is important to remember that the ‘S’ in ‘CSR’ stands for social, not only environmental, sustainability.”

DuBuisson pursued the Corporate Environmental Management (CEM) specialization at the Bren School, and she has seen first-hand that environmental managers in business can make a big difference.

“If you can make changes in business operations, global supply chains, and material sourcing, you can have a tremendous positive

Alumna Chats with Sec’y of State

The cover of the Fall 2012 issue of Bren News (below), showed Anne Middleton (MESM 2008) with her guitar in a rain forest in Cameroon, where she manages a sustainable hardwood timber operation for Taylor Guitars.

On January 29, Anne spoke by remote feed to U.S. Secretary of State John Kerry, after he presented Taylor with the Award for Corporate Excellence in the Small Business category, for its environmental and social initiatives in Cameroon.

See the video here: http://1.usa.gov/1Hvsw3. Secretary Kerry presents the award to Bob Taylor at around 44:40, and Anne speaks shortly thereafter.

Greening — with style! Jennifer DuBuisson (and Buzz Lightyear) at LEGO headquarters, where she was recently hired as Senior Manager for Environmental Sustainability.

see LEGO on page 16
impact,” she says. “I fully believe that businesses, industry forums, business-NGO alliances, and cross-industry collaborations are critical actors in moving us forward on the sustainability journey. Implementing change can take time, but businesses can still respond more quickly than governments, and businesses are in a great position to communicate to consumers about sustainability challenges and solutions.”

As for DuBuisson’s preparation, she says, “The CEM specialization provided great exposure to the types of challenges, opportunities, and focus areas companies are working on. CEM students develop the necessary skills to think about problems holistically and understand the tradeoffs, which are a very real part of working in a business.”

She sees the interdisciplinary element that runs through the larger Bren School curriculum as responsible for distinguishing a Bren CEM student from a traditional MBA student who may have an environmental focus.

“You come out of Bren well-rounded,” she says. “That’s important in these kinds of jobs, which are rare in the corporate setting and require you to cover a variety of topics. Having expertise in a few areas or competency over multiple disciplines is what separates the Bren graduate, and that’s what you’re not getting in an MBA, where you might have only a peripheral overview of the environmental aspects of business.”

Still, DuBuisson encourages Bren students to build the best foundation of business knowledge they can. “It’s important to understand how businesses, and not just green businesses, work and to be able to contribute in more than one way,” she says. She advises students to “pick a few areas, whether it’s LEED, life-cycle-assessment, greenhouse gas accounting, report writing, or something else, and develop strong competencies in them, because you need to wear a lot of hats.”

But beyond the business and technical knowledge, perhaps nothing is more important than relationships. DuBuisson has some great advice for Bren students on that front:

• “When you move to a new company, take the time to understand how it operates. Building positive relationships internally is key, because as a sustainability professional in a corporate setting, you don’t own anything. You don’t own manufacturing or product and packaging design; all you can do is influence those areas and try to provide the tools and business cases to make sure that you’re lessening your impact, so relationships are really important.”

• “Listening and learning to be empathetic are skills I use often, because not everybody agrees with the goals of sustainability, and at most companies, it’s still an uphill battle. The more you can listen and understand the current process and what the challenges are, the more you’ll be able to realize opportunities and recognize the levers you can pull.”

• “Develop close relationships with your current cohort at Bren, who will be your colleagues in the work world. I often reach out to my cohort and my friends — for insight, best-practice sharing, introductions — so build those connections. It’s a small world, and we overlap a lot.”

Finally, she says, be patient. “Avoid thinking that when you leave school, right away you’re going to be this important decision-maker in sustainability in a corporate setting, because that’s not necessarily true. You have to pay your dues, and it’s important to know that, set your expectations accordingly, and learn about the business first. Very few companies understand what it means to have a master’s degree in corporate environmental management, so be ready to sell yourself and your skills.”

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