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INSTITUTE OF THE ENVIRONMENT ANNUAL REPORT 2013–14

2013-14
FROM THE DIRECTORS

It’s been another rewarding year for the Institute of the Environment and for environmental excellence at the University of Arizona. We thank all who helped make it happen, especially our great staff, students, campus colleagues, and community supporters.

IE will complete its fifth year as the new and reinvented version of the Institute for the Study of Planet Earth in fall 2014, and there are many accomplishments on which to reflect. Consider that our Carson Scholars Program has just announced its fourth cohort of exceptional graduate students from across campus. Rachel Carson would be proud of the UA’s unique blend of top-level disciplinary training, unusually rich interdisciplinary interaction, and special focus on communication. Listen to a Carson Scholar and you’re likely listening to a future scientific star and environmental leader. We are very grateful to those donors who have supported these fantastic graduate students.

Or note that we’ve also just recently wrapped up efforts to hire 35 new environmental hires across the University, further positioning the UA to have a positive global environmental impact. None of the hires would have been possible without our terrific partners across campus, especially our deans and department heads, the vice president for research, and the UA Water, Environmental, and Energy Solutions initiative.

As you know, IE is all about providing options to deal with the biggest challenges of the 21st century (and yes, many of them are going to be environmental). The rollout of two major climate assessments in the last year highlights why climate science and adaptation is an important focus, especially in Arizona. First, the U.N.’s Intergovernmental Panel on Climate Change Fifth Assessment made clear how well the science is now understood, and how climate change is already driving substantial impacts around the globe. In addition, the release of the U.S. National Climate Assessment (NCA) brings the risks associated with climate change home, making it clear Arizona and the Southwest are a bull’s-eye of climate change challenges. IE researchers and faculty affiliates played important roles in these assessments, with our very own professor Kathy Jacobs (who is now back and among IE’s staff) directing the NCA from the White House.

IE also helps develop solutions to the climate challenge. The UA Renewable Energy Network aims to limit the risks of climate change through low carbon options while also building a major renewable energy economic engine in Arizona. IE’s array of federally-funded climate science projects, ranging from the Climate Assessment for the Southwest (CLIMAS), the Southwest Climate Science Center, and the NOAA International Research Applications Program all work with different stakeholders in society, from Arizona and beyond, to create new, useable climate impact and adaptation knowledge. We are also working to understand how Department of Defense installations in the Southwest can deal with climate and how drought risks are growing at home and around the world.

UA has become a national and international powerhouse in interdisciplinary, use-inspired climate scholarship, education, and outreach. In this last year, we continued to build on this foundation by launching a new flagship Center for Climate Adaptation Science and Solutions (CCASS) as a cross-university effort to enhance and expand the UA’s ability to serve stakeholders with better climate science, information, and solutions.

IE success has translated over the years into the need for ever-increasing collaboration. In summer 2015 we’ll move into the super “green” Environment and Natural Resources 2 building with other major environmental units on campus. To say we’re excited is a vast understatement, and all the building lacks at this point is the funding to make our integrated green roof and meeting space a reality!

As we continue to strengthen, innovate, and expand, we are not only well aware of the challenges before us, but also excited by the opportunities to frame the future. With the continued support of the University of Arizona family and our generous donors and collaborators, we are looking forward to another great year.

Find out more about the broader UA achievements through the environmental portal. PORTAL.ENVIRONMENT.ARIZONA.EDU
Informing choices, advancing solutions

Mission
The Institute of the Environment’s mission is to advance innovative solutions to environmental challenges in Arizona and around the planet. Harnessing the collaborative expertise and ingenuity at the University of Arizona and among its partners, the Institute furthers knowledge and understanding about Earth’s natural systems and their interactions with people. The Institute also links cutting-edge environmental scholarship with real-world issues to help societies, especially those in dry regions, make the best-informed decisions for a sustainable future.
ACHIEVEMENTS 2013–14


$382K TO FACULTY

$102K TO STUDENTS

AWARDED $382,500 TO FACULTY AND $102,000 TO GRADUATE STUDENTS AS SEED GRANTS, TRAVEL AWARDS, SALARIES, AND FELLOWSHIPS TO ADVANCE RESEARCH IN A BROAD RANGE OF ENVIRONMENTAL, ENERGY, AND PUBLIC POLICY ISSUES.

60+ NEWS STORIES

TOPICS: CLIMATE, CLIMATE CHANGE AND ADAPTATION, AND MORE

IE STAFF WERE QUOTED OR REFERENCED IN MORE THAN 60 NEWS ARTICLES AND RADIO AND TELEVISION SEGMENTS RELATED TO CLIMATE CHANGE, IMPACTS, AND ADAPTATION AND OTHER ENVIRONMENTAL ISSUES.

$10.8M PROJECT GRANTS

CARSON SCHOLARS

SELECTED 10 NEW GRADUATE STUDENTS—ALL POTENTIAL SCIENTIFIC LEADERS—TO PARTICIPATE IN THE CARSON SCHOLARS PROGRAM, BRINGING THE TOTAL NUMBER OF CURRENT AND FORMER CARSON SCHOLARS TO 42.
Columbia University

40+
CAMPUS & COMMUNITY ACTIVITIES
SPONSORED AND CO-SPONSORED MORE THAN 40 CAMPUS AND COMMUNITY ACTIVITIES, INCLUDING SCREENINGS OF THE MEDITATIVE DESERT DREAMS AND THE DOCUMENTARY SWITCH; THE FOURTH ANNUAL ENVIRONMENTAL RESEARCH GRAD BLITZ; FASCINATING TALKS BY AWARD-WINNING WRITERS, ARTISTS, AND LEADING HEALTH EXPERTS; AND MANY OTHER EVENTS BOTH ON AND OFF CAMPUS.

33 ARTICLES 
CHAPTERS 
REPORTS
IE STAFF PUBLISHED 33 JOURNAL ARTICLES, GUEST COLUMNS, AND REPORTS ON CLIMATE CHANGE AND ADAPTATION, DROUGHT, WATER MANAGEMENT, RISK, AND OTHER TOPICS.

130+
SPEAKING ENGAGEMENTS
TOPICS: SOLAR POWER, ENERGY AND WATER POLICIES, CLIMATE CHANGE, DROUGHT RISK, ART AND SCIENCE, WILDFIRE, AND MORE
IE STAFF SHARED THEIR EXPERTISE ON CLIMATE CHANGE AND ADAPTATION, DROUGHT, SOLAR POWER AND RENEWABLE ENERGY, SUSTAINABILITY, ART AND SCIENCE, SECURITY, AND OTHER ENVIRONMENT-RELATED TOPICS DURING MORE THAN 130 SPEAKING ENGAGEMENTS, SHARING SCIENCE WITH MORE THAN 3,000 PEOPLE.

56 WEBSITE DOMAINS
MANAGED 56 DOMAINS (OR URLS) LINKING VISITORS TO WEBSITES REPLET WITH INFORMATION ON ENVIRONMENTAL RESEARCH AND RESOURCES.

INSTITUTE OF THE ENVIRONMENT ANNUAL REPORT 2013–14
Advancing Solutions
for a vibrant, sustainable world
Climate

IE aims to make information about climate both useful and usable through innovative research, funding initiatives, student opportunities, and ongoing dialogue with natural resource managers, civic leaders, policymakers, and members of the public. IE houses research initiatives and helps support projects that draw the nation’s top researchers on climate change, climate variability, and adaptation to better understand the impacts of drought, heat, storms, and fire on ecology and human lives.
Improving Drought Planning on the Hopi Reservation

A nearly 20-year drought in northern Arizona has shriveled crops, forced ranchers to cull cattle, and caused unforeseen expenses for the Hopi people, many of whom are dryland farmers and ranchers dependent on seasonal rains for their livelihoods.

While the impacts of drought have been clear, the lack of reliable, long-term weather stations, and thus consistent data, has made it difficult for members of the Hopi Tribe to accurately assess current drought conditions and respond as well as they would like, says Daniel Ferguson, director of the Climate Assessment for the Southwest (CLIMAS) program, which is housed within IE.

With a grant from the National Oceanic and Atmospheric Administration (NOAA), Ferguson and other CLIMAS researchers are working to help the Hopi Tribe’s Department of Natural Resources (HDNR) gather critical data that will allow the tribe to respond to and plan for drought conditions more effectively.

Given the lack of available weather and climate data on the reservation, the project has emphasized the importance of local knowledge and human observation. “We’re working with technicians and range managers who drive around the reservation and document conditions across the landscape each month,” Ferguson says. “We’re trying to understand if we can monitor drought by blending observations of drought impacts with the limited precipitation data that is available.”

By monitoring drought impacts, researchers and Hopi land managers hope to create a fuller picture of conditions on the reservation that can help tribal leaders and policymakers mitigate the effects of drought.

The project has been well received by the team’s Hopi collaborators. “The UA team is helping us identify and monitor the specific drought impacts that local communities are most vulnerable to.

[This work] is helping us lay the groundwork to improve our drought planning efforts,” says Clayton Honyumptewa, HDNR director.

Beyond its immediate contribution to the Hopi, the project also will yield key practices for how local communities in drought-vulnerable regions around the world can monitor climate conditions and contribute to critical decision making, Ferguson says.
The UA team is helping us identify and monitor the specific drought impacts that local communities are most vulnerable to. [This work] is helping us lay the groundwork to improve our drought planning efforts.”

Clayton Honyumptewa

For a complete look at CLIMAS’ accomplishments during 2013–14, visit BIT.LY/CLIMASAR.
New Center Focuses on Climate Change Solutions

A new center launched in January 2014 will help provide solutions for some of the toughest challenges related to planning for and acting on climate change and climate and weather extremes.

Housed within IE, the Center for Climate Adaptation Science and Solutions (CCASS) will bring together faculty from different fields to connect research to real-world issues faced by land-use planners; forest, wildfire, and water managers; and public agencies, businesses, utilities, farmers, non-government bodies, and private citizens.

“In the Southwest we are seeing the impacts of climate change with extended periods of drought, higher temperatures, and larger wildfires, all of which are a major challenge for citizens,” says Katharine Jacobs, director of the new center and a professor in the UA’s Department of Soil, Water and Environmental Science. “One of our primary objectives is to help people be better prepared for climate and associated extreme events. We can connect stakeholders and members of the public with researchers at the UA to help them understand the risks as well as what their adaptation options are.”

Jacobs, a nationally recognized water, climate, and adaptation expert, returned to Tucson after a four-year term as assistant director of the U.S. Office of Science and Technology Policy in the White House. She served as lead advisor on climate adaptation and water issues and director of the third National Climate Assessment (NCA), released in May 2014. Eight scientists from the UA—more than any other university in the country—helped write the report. All are either IE staff—Jacobs, Diana Liverman, Jim Buizer, and Gregg Garfin—or IE-affiliated faculty.

Unlike previous assessments, this NCA addresses ways climate change is impacting multiple sectors to give those making decisions a new platform for managing risk. “It outlines the cascading effects of climate-related impacts, such as impacts of heat waves affecting electrical systems or coastal inundations affecting transportation and energy access,” Jacobs says.

The most important piece of her experience in Washington, D.C. was witnessing “the transformation of the federal science agenda from being focused on a fundamental scientific understanding [of climate change] to moving into an arena of social relevance,” Jacobs says.

With this focus in mind, Jacobs will help CCASS bring together the community of adaptation experts at the UA and beyond to focus on practical climate change solutions that help safeguard lives, livelihoods, and property.
Preparing for Life in a Future Climate

Across the globe, economies and social systems—from agriculture to water resources to tourism—have developed in relatively stable climates. But predicted increases in extreme events such as floods, prolonged heat waves, and wildfire as well as more subtle climate changes will challenge these systems to adapt to new and constantly shifting “normals.”

“We’ve created these systems within a range of climate variability and then adapted to that range,” says Jim Buizer, IE’s deputy director for climate adaptation and international development. “We don’t want to get locked into managing for yesterday’s climate, and that requires understanding the interplay between the changes in our climate and people.”

To help address this challenge, social and climate scientists from the UA and Columbia University are partnering to assist three global regions in planning for the many realities of climate change.

Funded by NOAA and the U.S. Agency for International Development, the project will focus on the Caribbean, South and Southeast Asia, and West Africa, says Buizer, UA’s principal investigator on the project.

In May 2014, the research team convened a workshop in Kingston, Jamaica, to better understand on-the-ground issues in the Caribbean and inform future research. By integrating social and climate science, the work is forging a closer connection between science and end use, making climate information more useful and usable.

Staying Heat Smart and Healthy in the Southwest

Heat stress, infectious diseases, asthma. These are but a few human health risks that extreme weather and climate change pose in the Southwest, and IE is partnering with the community to help ensure the well-being of people in the region.

Hosted by Physicians for Social Responsibility and co-sponsored by IE, Climate Smart Southwest: Ready or Hot? brought together 400 climate scientists, public health experts and professionals, national and international environmental leaders, representatives of Native American and Mexican border communities, and concerned citizens to discuss the public health vulnerabilities to climate change in the region and how to mitigate risks.

Of particular concern in the Southwest is how a community responds to extreme heat. “What are the social networks to keep the most at-risk people—often the elderly or the sick, who have only swamp coolers—safe? The standard way is to take people to cooling shelters, but what if there’s a big power outage?” says Gregg Garfin, IE’s deputy director for science translation and outreach, who helped plan the conference. Although the likelihood of such an event is small, it could have a big impact on the people and even pets living in the region. “The combination of power outage and heat wave is the Hurricane Katrina or Hurricane Sandy for our city,” Garfin says of Tucson.

Working groups created at the event are continuing to collaborate to develop initiatives aimed at solving this type of public health issue and others.
IPCC: The Good, the Bad, and the Hopeful

The Fifth Assessment Report by the United Nations Intergovernmental Panel on Climate Change (IPCC) released this past spring paints a grim picture of coming change but also offers glimpses of hope for the future.

IE’s co-director Jonathan Overpeck, a coordinating lead author for the Fourth Assessment Report, which received the 2007 Nobel Peace Prize, was a lead author of a chapter on terrestrial and inland water systems in the latest report.

“The big thing this time around is that the science of climate is much better understood and it’s much more clear that the climate is already changing and having substantial impacts around the world,” Overpeck says.

The bad news is that by contributing to drought, flooding, and other weather extremes, climate change is impacting water supply and food production across the globe, particularly in parts of the world that don’t have the technology to innovate quick solutions.

“What is now happening is what we predicted would happen, which gives us faith in the models used for projecting into the future.”

Jonathan Overpeck

“Climate change is pushing plants and animals out of their habitats and up mountains or into colder waters, making it more difficult for them to survive. Increases in carbon dioxide emissions are making the oceans more acidic, threatening sea life. As temperatures increase, sea levels rise, resulting in coastal disasters such as those associated with Hurricane Sandy. At the current rate of climate change, western regions of the U.S. will see the continued drying of the Colorado River and eventual struggles over water,” Overpeck says. “Climate change is also having serious impacts on western forests and woodlands.”

But there is also some good news in the IPCC report. For one thing, scientists have more confidence in projecting climate change impacts.

“What is now happening is what we predicted would happen, which gives us faith in the models used for projecting into the future,” he says.

“We’ve also grown smarter about adaptation. “We’re already starting to develop ways to adapt to climate change that are more sophisticated than they were seven years ago. And we’re getting a firm understanding of what technologies and policies are needed to reduce greenhouse gas pollution and slow climate change,” Overpeck adds.
Blasts from the Past: Studying the Risks of Prolonged Drought

The U.S. Southwest is no stranger to hot and dry. But a prolonged drought could be devastating to wildlife, water supplies, and human lives and livelihoods.

“A megadrought would be a show stopper in the Southwest,” says Jonathan Overpeck, IE’s co-director and professor of geosciences and atmospheric sciences. “Our water supplies would be overwhelmed and our natural systems would be hit harder than we’ve ever witnessed. So it’s important to learn about these prolonged droughts and to learn how to be better prepared for them,” he says.

With funding from the National Science Foundation, U.S. Department of Agriculture, and the U.S. Department of Energy, Overpeck is working with colleagues Diana Liverman, professor of geography and development, and Julia Cole, professor of geosciences, to better understand the occurrence of prolonged drought and how societies might adapt to prevent water shortages, agricultural disasters, and other detrimental impacts.

Using satellite and instrumental observations, state-of-the-art computer models, and paleoclimate records such as tree rings, lake and sea sediments, cave formations, and ocean corals for the last 2,000 years, the researchers hope to better understand past periods of drought in the U.S. Southwest, northern Mexico, and other drought-vulnerable areas such as Australia, the Amazon, and West Africa.

Initial findings suggest that several prolonged and intense droughts in the last 2,000 years were much worse than previously thought, and that current climate model projections of future drought impacts are underestimating the possible severity of these impacts, Overpeck says.

Understanding the various influences on drought, both natural and human-caused, will help the researchers better estimate the risk of multiyear droughts and better inform stakeholders. “We want to inform resource managers about the likelihood of severe and sustained droughts based on our understanding of the past, but also about how this risk might alter as a result of climate changes now and in the future,” Liverman says.
Pathways to Adaptation for the Pyramid Lake Paiute Tribe

The Pyramid Lake Paiute Tribe has deep cultural, physical, and spiritual connections to Pyramid Lake, a terminal desert lake fed by the Truckee River in Nevada. The Paiute once called themselves the “Kooyooee Tukadu” or “Cui-ui Eaters,” after the now-endangered cui-ui fish endemic to the lake, and today rely on revenue from Lahontan cutthroat trout fisheries for their livelihoods.

But warmer temperatures, decreasing rain and snowfall, and diminished water quality threaten the tribe’s traditions and economic ties to their environment, spurring Karletta Chief to determine the Paiute’s potential to adapt to climate change and help the tribe develop water management strategies.

Colleagues from the University of Nevada, Las Vegas and the U.S. Geological Survey also are involved in the research, which is funded through a grant from the IE-based Southwest Climate Science Center to help decision makers, resource managers, and communities adapt to the effects of climate change in the U.S. Southwest.

Chief, an assistant professor in the UA’s Department of Soil, Water and Environmental Science and a member of the Navajo Nation, has been working with the Paiute since 2009. In a survey she conducted with members of the tribe, 93 percent of respondents expressed a desire for climate change action at the national level.

In fall 2013, Chief and her research team held a two-day interactive workshop with the tribe and other stakeholders to identify the main environmental issues they face and brainstorm management alternatives to those issues.

Water quality and water quantity were among
the most significant issues community members voiced, says Autumn Bryson, director of the tribe’s Environmental Department.

“It’s really important to the tribe to keep water levels up to keep cui-ui populations healthy but also to maintain water quality that’s suitable for the cui-ui to live in,” Bryson says.

With stakeholder input, Chief and other researchers will identify adaptive strategies to help the tribe prepare for changes and will continue to gather data and traditional ecological knowledge during a second workshop. “The strategies that they’re going to be recommending for the tribe to be able to adapt to climate changes are really helpful,” Bryson says.

Chief’s research team will offer an online video that outlines the habitat and spawning needs of both the cui-ui and the trout to identify where the species might be most at risk to changing conditions. “[The work is] going to give us a head start in adapting to climate change,” Bryson says.

“It’s really important to the tribe to keep water levels up to keep cui-ui populations healthy but also to maintain water quality that’s suitable for the cui-ui to live in.”

Autumn Bryson
Renewable Energy

Based in IE, the UA Renewable Energy Network (REN) promotes the expansion of clean and affordable solar, wind, and other renewable energy in the U.S. Southwest and beyond. By supporting breakthrough research and forging partnerships with industry and government, REN is reducing our reliance on carbon-emitting energy sources and is helping to alter our energy systems to meet 21st century demands.
Faculty and students in the UA’s Sustainable City Project (SCP) design studio are using a grant from the Renewable Energy Network to reimagine and redefine roadways and urban space for the 21st century. Their plan would harness solar and wind energy and reclaim water through condensation, gray water, and rainwater harvesting systems, says SCP Director Linda Samuels.

In collaboration with Arizona State University and University of Nevada, Las Vegas, 39 architecture, planning, and landscape architecture students and three faculty members at the UA are exploring how the proposed Interstate 11 freeway could transform our decades-old model of interstate transportation into a sustainable and technologically advanced supercorridor of smart infrastructure, Samuels says.

The project would link Las Vegas, Phoenix, and Tucson as part of the larger I-11 CANAMEX project to connect Canada to Mexico through the U.S. “New infrastructure must express civic responsibility for the 21st century and be an agent of environmental, social, and economic change. The opportunity to transform the legacy of sprawl into a new vision of sustainable building is unprecedented,” Samuels says. “The REN grant initiates those first steps towards developing visionary solutions to some of our country’s oldest and most stubborn problems—our love of mobility, our addiction to cheap energy, and our demand for easy accessibility. Simultaneously, we are building a new generation of student researchers and designers who recognize the value of cross-disciplinary collaboration, big thinking, and breaking out of the status quo.”

The REN grant led to additional funding from the Rob and Melani Walton Sustainable Solutions Initiative at ASU. The project has convened a local, state, and regional research team and is already sharing plans and ideas with the Arizona Department of Transportation, Samuels says.

Setting Their Sights on a Sustainable Supercorridor

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Celebrated for its vast stretches of natural beauty, wild rivers, and old-growth forests, the western U.S. is also home to some of our country’s most critical environmental issues, including drought, wildfires, urban sprawl, and challenges relating to natural resources. A number of IE researchers and affiliated faculty are working toward solutions that will help us better conserve the land as well as the people, plants, and animals that inhabit it.

Stewardship of the West

TWO SONORAN PRONGHORN DOES DRINK FROM UKEN TANK ON THE BARRY M. GOLDFWATER RANGE WHILE TWO BUCKS STAND IN THE BACKGROUND. THE DOE ON THE RIGHT, WITH THE BLUE RADIO COLLAR, WAS BORN IN THE CABEZA PRIETA NATIONAL WILDLIFE REFUGE CAPTIVE BREEDING PEN IN 2008 AND RELEASED IN JANUARY 2012. THE BUCK WITH THE RIGHT BLUE EAR TAG (ON THE LEFT) IS ALSO A CAPTIVE-RAISED BUCK RELEASED IN DECEMBER 2009 OR 2010. THE OTHER BUCK AND DOE ARE UNMARKED, WILD-BORN PRONGHORN.
Studying the Shy Sonoran Pronghorn

The endangered Sonoran pronghorn once ranged widely in Arizona, California, and Sonora, Mexico. Now, according to the U.S. Fish and Wildlife Service (USFWS), only about 160 free-ranging animals live in the U.S., with an additional 434 living in Mexico.

David Christianson, an assistant professor in the School of Natural Resources and the Environment and an IE faculty affiliate, wants to know why their numbers are low. With funding from the USFWS, Christianson is studying the impacts of humans on the spry tan and white ungulates.

Hit hard by drought, most of the U.S. Sonoran pronghorn live relatively close to the U.S.-Mexico border in Organ Pipe National Park, Cabeza Prieta National Wildlife Refuge, and the Barry M. Goldwater Air Force Range. The fastest mammal in North America, pronghorn are easily spooked by cars, airplanes, and people.

“The hypothesis from the Fish and Wildlife Service is that border activity is part of the reason that pronghorn numbers have declined, which has prompted attempts at recovery using captive breeding,” says Christianson, who joined the UA as part of a campus-wide environmental hiring initiative coordinated by IE.

Because observing the elusive animals can be difficult, Christianson and his graduate students spend long hours in the field and also rely on data from motion-sensing cameras they’ve set up near existing water and feeding troughs. “We can test if the frequency of use by pronghorn is affected by the frequency of use by humans,” he says. “From what we see on cameras, most human activity is associated with border traffic, as well as from personnel from the various federal agencies.”

While it’s likely that humans have some impact on the pronghorn, Christianson says it’s too early in his study to gauge the extent. “The question is whether or not that effect is significant at all to the survival and reproduction of the species and, if so, what is the magnitude of that effect,” he says.

Understanding that impact, Christianson says, will help land managers make better decisions aimed at conserving the endangered animal.
Report from the Field

By Stephanie Doerries, 2014-15 Carson Scholar and Ph.D. student, School of Natural Resources and the Environment

A typical field day starts one to three hours before sunrise. Our goals are to locate Sonoran pronghorn from an observation point, conduct a behavioral observation, and collect fecal samples while avoiding disturbance to pronghorn. We often rely on radio-telemetry to help us locate animals. Hopefully, we time our hike to an appropriate observation point so that we are visually scanning for pronghorn by sunrise.

Once we locate a group of pronghorn, we record key behaviors such as grazing, browsing, grooming, fighting, and drinking, as well as any interactions with other species, including humans. Within a few days, we also collect one scat sample for each individual observed. On our way back to the field house, we usually stop at one or more of our 67 motion-sensing cameras to conduct routine maintenance and collect images for classification.

My favorite field days are when I find a group of unmarked pronghorn with fawns. One morning, I observed a fawn come running out from behind some vegetation pursued by a coyote. Two does cut the coyote off and chased it more than 500 meters away from the group. Because fawn recruitment is the most important variable impacting Sonoran pronghorn population growth, confirmed fawn survival (for an hour, at least) is encouraging for recovery.

“**My favorite field days are when I find a group of unmarked pronghorn with fawns.**”

Stephanie Doerries
The premise of IE’s Arts and Environment initiative is black and white: works with canvas, paper, or piano keys can be emotionally and viscerally powerful enough to galvanize action and unleash the imagination to tackle our most pressing environmental problems.
Poetic Experiments at Biosphere 2

Carson Scholar and IE graduate research assistant Eric Magrane conducted an art-science experiment in which he placed poets and writers on public display for two days in Biosphere 2’s various rooms and biomes and asked them to conduct research about their experience. Specifically, he wondered how an experiment like this might foster different ways of thinking and approaching environmental issues in effective ways.

“Creative research adds to the depth and strength of human knowledge and also points to ways that we might help turn that knowledge into action. One way may be a renewed understanding of the intricacy of our interconnections with the processes of the Earth,” Magrane says. This project was co-sponsored by the UA Poetry Center, Biosphere 2 Institute, and the UA Green Fund.

ENVIRONMENT.ARIZONA.EDU/PROXIMITIES/POETIC-FIELD-RESEARCH-BIOSPHERE-2

Art that Walks in the World

In spring 2014, IE organized a workshop in which 25 UA faculty, students, and creative community members met with William L. Fox, director of the world-renowned Center for Art + Environment, to foment ideas about art and science collaborations. In a separate public lecture, “Art in the Anthropocene,” Fox shared examples of artist projects that intervene with natural systems. His visit was co-sponsored by the School of Art, English Department, School of Geography and Development, IE, and the Water, Environmental, and Energy Solutions initiative.

ENVIRONMENT.ARIZONA.EDU/PROXIMITIES/ART-WALKS-WORLD-CONVERSATION-WILLIAM-L-FOX

Limitless Perceptions of Environment

IE’s Grad Blitz, an annual gathering of graduate students involved in environmental research, included for the first time work from creative fields such as fine art, media arts, and creative writing. The creative presentations illustrated new ways of sharing information and revealed the arts don’t simply serve to communicate science, but also offer another method of understanding our place in the world.

ENVIRONMENT.ARIZONA.EDU/NODE/2011
IE is inspiring new, cross-disciplinary partnerships for researchers to creatively address some of society’s most critical environmental concerns. It is providing leadership and learning opportunities to students to help prepare our future environmental problem solvers. And it is creating space for dialogue between the UA and the surrounding community about sustainability, climate change, renewable energy, ecological stewardship, and more.

Campus & Community

UA SCHOOL GARDEN INTERN AMANDA PFEIFFER CONDUCTING A LESSON ON OBSERVATION AT THE DESERT TORTOISE HABITAT, MANZO ELEMENTARY SCHOOL.
“[The Carson Scholars’] passion, the depth of their knowledge, and the unbridled enthusiasm with which they share it is contagious, and they take very complex issues and translate them for mainstream people to understand. I cannot imagine that there is a program within the University of Arizona that I would like to be affiliated with, supporting, and doing my best to share, more than this one.”

Gina Murphy-Darling
(aka Mrs. Green)

CARSON.ARIZONA.EDU

Carson Scholars: Our Future Environmental Stars

Dedicated to the vision created by Silent Spring author Rachel Carson, IE’s Carson Scholars Program supports graduate student research and trains Scholars to effectively explain their environment-related work to the public. Now in its fourth year, the program continues to build a network of graduate students—42 and counting—and faculty who are committed to advancing knowledge and awareness of our natural environment. The program is funded by the Institute of the Environment, Biosphere 2, the Renewable Energy Network, and private donations through the Rachel Carson Circle. Several of our 2013–14 scholars are highlighted on the following pages.
Blake Coughenour
COLLEGE OF OPTICAL SCIENCES

Blake Coughenour may have found a way to make solar energy more affordable. Funded by the U.S. Department of Energy’s SunShot program, his research uses optics to concentrate sunlight onto highly efficient photovoltaic cells. A typical solar panel only converts 20 percent of sunlight into power, Coughenour explains, because it uses only silicon. His model uses solar cells made of state-of-the-art materials, including indium, gallium, arsenide, and germanium, which allow more than 30 percent of sunlight to be converted into energy. In the past year, Coughenour has designed and patented a solar engine that generates as much power as three solar panels but is small and light enough to hold in your hand. “What is unique about our optics compared to other solar concentration systems is that we can still generate power even when they’re not pointed directly at the sun, allowing our support structure to be more lightweight. That means lower cost from less steel and concrete,” Coughenour says.

Lisa Wang
DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY

While scientists know that butterflies are drawn to color, they haven’t yet understood what it is about color that draws them. “If a butterfly prefers to visit yellow flowers, is it because it is attracted to the yellow hue or the high brightness of yellow?” asks Lisa Wang, a master’s student specializing in animal behavior. Her research uses LED lights to tease apart hue and brightness to see which affects color preference behavior in nectar-foraging pipevine swallowtail butterflies. Her findings indicate that both matter. “Together, hue and brightness color components affect butterfly behavior,” Wang says. Those findings have important implications for plant-pollinator biology and pollinator-dependent agriculture. “Understanding the color preferences of pollinators can help aid us in creating more efficient plant-pollinator systems that are the foundation of much of our produce, including apples, melons, squash, almonds, and wine. Most pollinator-dependent agriculture depends on bee pollinators, which are highly visual insects that rely on color for making decisions about which flowers to visit and avoid.” Wang is grateful to the Carson Scholars program for providing her with a network to collaborate and communicate with researchers of other disciplines.

Laurel Elizabeth Bellante de Escalante
SCHOOL OF GEOGRAPHY AND DEVELOPMENT

Laurel Bellante wants broad audiences to know that farmers and food advocates in Chiapas, Mexico, are working to create a new kind of food system, one that links producers and consumers who support more ecological and socially just forms of production. To that end, she is creating a multimedia story to make this new system visible. Bellante says the challenges of building such networks in Mexico are similar to those in the U.S. in terms of creating affordable access to specialty markets. However, unlike in the U.S., where many small-scale farmers have been pushed off their land, many families in southern Mexico still have access to land and resources. “It’s still within possibility there to build these networks. Through
human consciousness and solidarity we can actually create ways to protect human-environment connections that we believe in for long-term sustainability,” she says. The Carson Scholarship has helped her create networks of a different kind as well. “Having opportunities to come together with people from different disciplines is one of my favorite things,” she says. “I always feel enriched by those encounters.”

Rodrigo Rentería-Valencia
SCHOOL OF ANTHROPOLOGY

When Rodrigo Rentería-Valencia started making trips to the Gulf of California coast in Sonora, Mexico, he was drawn to the ritual ceremonies of indigenous Seri. “The more I understood the community, I saw that you can’t understand anything without understanding their larger relationship with the environment,” Rentería-Valencia says. Now, he is looking at how the implementation of a neoliberal conservation program is impacting social and economic identity. In 1963, the Seri were forced off their ancestral Tiburón Island when the Mexican government declared it a national protected area. A decade later, bighorn sheep were introduced on the island as part of a wildlife management program that today includes upscale, limited trophy hunting of the sheep. The program has had considerable social, economic, and environmental implications for the Seri, including developing expertise about a species that has no historical or cultural relevance to the native inhabitants. The project has allowed Rentería-Valencia to explore the role of expertise and ecological knowledge within an indigenous society and the influences of political forces over time. The Carson Scholarship is giving him valuable experience in speaking about his project. “It’s challenging, but in fact it’s a crucial part of the work. Where do you start your narrative? How do you tell the story?” he says.
New “Green” Degree Guide

IE has made it easier for undergraduates to learn about the more than 75 “green” academic degrees and concentrations and more than 40 environmental minors offered at the UA.

By consolidating descriptions of these majors and minors from across the University into a central Green Degree Guide, IE hopes students will be able to more nimbly navigate and select academic paths that align with their interests in the environment and sustainability. The guide includes a broad range of fields of study, from biology and geology to journalism, religious studies, and other areas with a more unexpected environmental component.

The Green Degree Guide joins the Green Course Guide, also created by IE, and the Green Career Guide in helping students sculpt their college and career trajectories. A future Green Engagement Guide will link students to internships, externships, volunteer work, and campus student clubs and organizations. The UA’s Green Fund, which allocates grants to support projects that make the UA a more sustainable place to live, work, and learn, is funding the Green Degree Guide effort.

New B.A. in Environmental Studies

The UA’s School of Geography and Development is offering a new Bachelor of Arts in Environmental Studies, connecting undergraduate students interested in the human aspects of the environment and environmental policy with a growing body of faculty experts.

“In the Anthropocene, when human activity is the dominant force changing the Earth system, we need people who are trained to understand the social causes and consequences of environmental change and who can develop and critically analyze the responses to our changing environment by individuals and institutions,” says Diana Liverman, who was instrumental in creating the new degree.

Course choices include social science and policy classes on water, land use, food, energy, the built environment, environmental history, gender and the environment, and climate-related issues in both urban and rural contexts. The degree is designed to complement the science and design-oriented degrees in the College of Agriculture and Life Sciences and the College of Architecture, Planning, and Landscape Architecture.
Teaching Students From the Ground Up

Dirt, vegetables, chickens, and a whole lot of elbow grease are seeding a new model for how school gardens can improve student learning and well-being.

Initiated in 2010, the UA’s Community and School Garden Program (CSGP), in partnership with the Community Food Bank of Southern Arizona, places up to 60 UA interns each semester in gardens in 15 under-resourced schools in the Tucson Unified School District (TUSD) and four community gardens that serve low-income neighborhoods.

In the gardens, the UA interns help elementary students understand the importance of caring for seeds, plant starts, and crops. In the classroom, they learn about contemporary food politics, democratic decision making, and community engagement, says Sallie Marston, a professor in the UA’s School of Geography and Development who directs the project and is an IE faculty affiliate.

This summer, thanks to a relationship IE developed with a foundation that supports local communities and innovative educational programs, funding was provided to enable the program to launch its first Green Academy for UA interns and teachers from Tucson’s Manzo Elementary School. Led by two UA graduate students who help manage the CSGP, the academy offered instructional strategies, knowledge, and confidence to teach through the garden.

“We’re working to create a more effective model of learning for students,” Marston says. “The garden program shows them how collaboration produces achievement for everyone, how they can solve problems more efficiently collectively, how they can become more attuned to caring for others, from chickens to plants to each other. We instill the idea that we’re all part of the same world and we have to work together to address locally some of the world’s problems.”

In the fall the interns will help deliver lesson plans that connect garden learning to classroom curriculum. An IE Carson Scholar will help spread the lessons of the Green Academy to other TUSD schools with gardens.

“The Community and School Garden Program is a model for student engagement with the local community at the University of Arizona,” says IE co-director Diana Liverman. “I’m glad IE has helped identify some support for the project and has promoted the opportunity for UA students to intern with the schools through our Carson Scholars Program and Green Course Guide.”

*For more on UA-Manzo partnerships, see page 38.

“We instill the idea that we’re all part of the same world and we have to work together to address locally some of the world’s problems.”

Sallie Marston
Research on Tap at Science Café

The great literary and philosophical salons of 17th and 18th century Paris often offered cups of wine to keep the ideas flowing. For the great scientific salons of today in Tucson, make that beer.

The 2013–14 UA College of Science’s Science Café series gave Carson Scholars the opportunity to share their research, practice communications skills they learned in the Carson Scholars Program (see page 27), and engage the Tucson community at Borderlands Brewing Company, one of four Science Café venues.

“The more we learn about how our world works and about the complex interdependence of our environmental systems, the more we understand the balance that our world needs to sustain life,” says Erin Deely, a senior program coordinator for the College of Science. “The UA College of Science is thrilled to partner with the Carson Scholars Program to offer the Borderlands Brewing Science Café series so the public can learn about the science and solutions being discovered by this new generation of environmental scientists.”


No Parking

A park instead of a parking space? That’s what student volunteers from the UA’s College of Architecture, Planning, and Landscape Architecture (CAPLA) and the SCP created in partnership with two local Tucson businesses, Exo Roast Co. and Tap and Bottle. Using recycled shipping pallets and Astroturf, the team designed and assembled a temporary urban parklet on the edge of the sidewalk on 6th Avenue and 8th Street in downtown Tucson.

“Our objective was to inform people about what is possible here,” SCP Director Linda Samuels says. “We have a tremendous amount of underutilized car space that we can more actively use for public space and people space.”

The parklet was recreated at two Tucson events: Cyclovia Tucson and the Pennington Street block party. The SCP is now working with the Living Streets Alliance, a pedestrian and bicycle advocacy group, to create a Community Engagement Toolkit that will help people envision new public space with greater social connectivity for the city’s underused paved areas. “Better, more sustainable streets have shade, green infrastructure, places for people to sit,” Samuels says. “A more sustainable city is a more livable city.”

HTTP://DOWNTOWN.ENVIRONMENT.ARIZONA.EDU
Irrigation Politics in Sonora’s Mayo Valley

A visit more than 10 years ago with communities seeking electricity and other basic services in Sonora, Mexico, opened Jeff Banister’s eyes to the struggle of rural people in Mexico and galvanized his interest in the region. Banister is now finishing a book manuscript exploring irrigation politics in the Mayo Valley of Sonora and how public policy since the late 19th century has affected local communities there. “At that time, the federal government began parceling out land, in theory to give to the Mayo Indians and to create agricultural companies. But over time the government has increased its authority over people and space,” says Banister, an assistant research social scientist at the Southwest Center and School of Geography and Development. His research examines how the mechanisms of that increased federal control over water, land, and people create what he calls an “exploitative social order.” To support his work, IE and the Udall Center for Studies in Public Policy awarded him a 2013–14 Udall Center Environmental Policy Fellowship. “It’s giving me the focus time I need to do the writing and even to do a little bit of extra field work that I’ve needed to do in Sonora. I’m extremely grateful,” he says.

Leveraging his Udall Fellowship, Banister, along with UA art historian Stacie G. Widdifield, was awarded a prestigious American Council of Learned Societies Collaborative Research Fellowship for a project on the visual and spatial history of water in early 20th-century Mexico. Both researchers are members of IE’s arts and environment network.

Predicting Climate Impacts on New World Plants

Brian Enquist spends a lot of his time cleaning dirty data. As the principal investigator for the Botanical Information and Ecology Network (BIEN), Enquist is standardizing data about New World plant species to make the information useful and useable to scientists, forest managers, and gardeners.

Standardizing or “cleaning” the data involves verifying geographic coordinates, which will make it possible to create topographic range maps for approximately 120,000 species, from aspen and Douglas fir to ferns and lianas. “By combining that primary data—over 40 million observations throughout the New World—with climate and soil information, we can provide a best estimate of where a species is likely to occur,” says Enquist, a UA professor of ecology and evolutionary biology.

An IE Faculty Exploratory Research Grant, awarded to projects involving interdisciplinary global change research or other related research activity, is helping Enquist incorporate future climate predictions into the maps. “Based on climate change, we can tell you the likelihood that a given species will be there or not in 40, 60, or 100 years,” Enquist says.

So far the data show disheartening news for forests. “Starting in 40 to 60 years from now we should start seeing some impressive collapses of western forests, and not just in the Southwest,” Enquist says.

Before that happens, Enquist and his team will release an iPhone app that uses GPS technology to tell users what plant species are near them, whether in and around Tucson or in the middle of the Amazon rainforest. Enquist hopes to make the app a general platform for allowing people to discover the diversity that currently surrounds them and how species will change.
Breakthrough Research and Real-World Solutions

Pioneering practical, innovative solutions for environmental challenges means thinking outside the box, not inside academic silos. The UA’s Water, Environmental, and Energy Solutions (WEES) initiative is designed to support and seed interdisciplinary research that addresses Arizona’s water, environment, and energy issues and helps boost economic vibrancy for the region, state, and beyond.

Co-managed by IE, the Renewable Energy Network, and the Water Sustainability Program, WEES funds were distributed through a variety of grants. “The WEES initiative gets people to think about the implications of their work beyond their narrow field as well as the work’s implications and applications to society,” says Betsy Woodhouse, IE’s deputy director. “An engineer brings different skills and a different perspective than a public health specialist, for example. But working together they can address real-world challenges facing our environment and our communities.”

Among the awards made, the initiative gave research grants to four cross-disciplinary projects that seek to enhance the production of renewable energy, create a more efficient and cost-effective tool for testing soil and groundwater contamination of Arizona Superfund sites, and develop new approaches for both evaluating the impact of and removing chemical contaminants in water.

Grants also were awarded to six new initiatives focusing on exposure science (the study of human contact with environmental contaminants) and risk assessment, food systems, food safety research, green infrastructure and urban sustainability, sustainable engineering, and resilient interdependent water-energy infrastructures. In addition, WEES speaker grants helped bring 12 distinguished speakers to campus, and matching funds for seven major research proposals resulted in nearly $17 million in new grants to the UA.
Taking the Waste Out of Wastewater

Shane Snyder is on a mission to find efficient ways to transform the water we discard into safe and sustainable drinking water.

In water-scarce regions of the world, including Arizona, water reuse is critical for sustainability, and Snyder’s research is recognized as a vital component of water reuse projects.

“Southern Arizona lies at the epicenter of a growing water crisis,” says Snyder, a UA professor of chemical and environmental engineering who also co-directs the new Water and Energy Sustainable Technology Laboratories. “And around the globe, population growth and urban density are taxing freshwater resources.”

Sea water desalination and water reuse are the dominant alternatives for supplementing water supplies, but they lead to unique challenges in protecting public health from what are known as “emerging contaminants” such as endocrine-disrupting compounds and pharmaceuticals, which are ubiquitous in municipal wastewater effluents.

With WEES funding, particularly from the Water Sustainability Program, Snyder is leading a research team to examine novel ways of treating and evaluating the complex mixtures of emerging contaminants present in wastewater. In another WEES project, Snyder is collaborating with a team led by Manish Keswani of the UA’s Materials Science and Engineering Department to explore a process that uses ultrasonic energy to split chemical bonds, thereby reducing emerging contaminants.

“These funds allow our team to expand into new areas that make us more competitive for future opportunities,” says Snyder, an IE faculty affiliate.

One of the nation’s top water contaminant experts, Snyder joined the UA as part of the University’s environmental hiring initiative, coordinated by IE, to recruit outstanding environmental faculty to campus. His work has been hailed as the first on the continent to link the presence of trace steroids to reproductive problems in fish, with implications for public health. With a track record of research funding from both government and the private sector, Snyder has been awarded more than $2 million in grants and philanthropy since his arrival at the UA.
IE at B2

Biosphere 2, about 30 minutes north of Tucson, is a laboratory beyond compare. With five biomes—desert, wetlands, savanna, ocean, and rainforest—under sealed glass, Biosphere 2 provides nearly inexhaustible opportunities for research in a controlled setting to better understand Earth, its living systems, and our place on it.

With funding from the state’s Technology Research Initiative Fund and in partnership with the Water Sustainability Program, IE has supported key elements of Biosphere 2 and is also partnering on a broad range of projects, from marine and desert ecosystems to art and student engagement.
Water, Soil, and Air: Understanding Life in a Life-sized Landscape

It’s the world’s largest artificial watershed, and after a few good douses of rainfall here and a bit of drought there, Biosphere 2’s Landscape Evolution Observatory (LEO) is helping us understand how ecosystems will respond to climate change.

Built side by side, three replicate hillslopes, each 100 feet long and 40 feet wide, form LEO. Each hillslope is packed with 600 tons of crushed volcanic rock and lava fragments known as tephra. Each slope also has its own rainwater system, which simulates everything from steady to spotty rainfall, allowing researchers to study how water, energy, and carbon move through the landscape under conditions relevant to Arizona and the Southwest. Nearly 2,000 sensors are buried in the tephra and transmit data to researchers to help them better understand how Earth systems evolve and affect each other. IE and its partners have funded equipment for a sister network of sensors in the aboveground atmosphere over the LEO hillslopes. The result is the largest instrumented watershed for integrating hydrological, geochemical, biological, and atmospheric sciences to tackle the big questions about the role of water.

“No, this is not a real hillside, but that’s the point,” says Peter Troch, science director at Biosphere 2. “We can understand how landscapes adapt not by theorizing about it but by doing experiments at a very large scale. That’s never been done anywhere in the world.”

LEO will allow scientists to observe how climate will affect soil, hydrology, and the atmosphere and to create experiments that are not possible out in the elements, such as limiting water supply for a period of time to simulate the effects of drought or observing how water is not only absorbed by the soil but also how it evaporates or moves laterally through the landscape.

LEO draws faculty and student researchers from various UA colleges and departments, including the School of Natural Resources and the Environment, the Departments of Soil, Water and Environmental Science, Geosciences, Atmospheric Sciences, and Hydrology and Water Resources, and the School of Geography and Development. Additional funding from the National Science Foundation will support research by scientists from Biosphere 2 and Johns Hopkins University to better understand how solutes and pollutants move through the landscape.

Little Leo

Manzo Elementary School in Tucson now houses “Little LEO,” a small-scale version of Biosphere 2’s LEO. A research site for fourth graders and a complement to the school’s successful learning garden, the mini LEO recreates the hillslopes of the original, using the same slope and aspect degrees, volcanic tephra, and seed samples.

“This kind of experiential learning allows schoolchildren to collect data on the impacts of hydrological change, soil nutrients, sunlight, and temperature on seed germination,” says Michelle Coe, a master’s student in the UA’s School of Geography and Development who developed the diminutive replica in collaboration with Manzo. “Manzo students are not only learning scientific techniques, but will actually be presenting and providing usable data to B2’s scientists at the end of the year.”

The project aims to boost elementary school students’ interest and awareness in science, technology, engineering, and math (STEM) while also providing a tested curriculum unit that can be easily integrated into the classroom and used by school district staff, faculty, and volunteers.

*For more on UA-Manzo partnerships, see page 31.

We can understand how landscapes adapt not by theorizing about it but by doing experiments at a very large scale. That’s never been done anywhere in the world.”

Peter Troch
A Lab Like No Other

When marine ecologist Rafe Sagarin tells people he conducts ocean research in the Sonoran Desert, he usually gets a ripple of laughter. Wait until they hear about his latest research site: an indoor sea.

But the new Desert Sea at Biosphere 2 is no joke. Originally designed as a coral reef, the 676,000-gallon saltwater tank will become a living model of the Gulf of California, complete with a cactus-studded island, rocky shorelines, and aquatic species. The new 60- by 100-foot “Gulf” will also offer up a laboratory on a scale found nowhere else on Earth, says Sagarin, an associate research scientist at IE and director of the Biosphere 2 Ocean. “Our goal is to help people understand the connection between the desert and the sea,” Sagarin says. “The Sonoran Desert is so diverse and rich because of its proximity to the Gulf of California,” he says, explaining that the summer monsoons, which help sustain the region’s unique ecosystems, are fed by moisture from the Gulf.

The new Desert Sea will give visitors and K-12 students the chance to get their hands wet studying coastal organisms and learning about tides in the rocky intertidal zone.

For researchers, the indoor sea is ideal for controlled scientific studies in marine ecology, biochemistry, climate change, ocean acidification, genomics, and conservation biology designed to tackle some of the planet’s most urgent issues, Sagarin says. In addition, UA graduate and undergraduate students will be able to carry out basic research about the Gulf of California much closer to home.

Submarines and other underwater equipment also will be testable in the indoor ocean, which offers the obstacles and variation—changing light and temperatures, for instance—found at sea. “You can test that technology in the ocean but you risk losing it,” Sagarin says. “You can test in a swimming pool, but that doesn’t give you any of the complexity that you have in the ocean.”

A public exhibit about the project opened in March 2014. To raise both funds and awareness about the Desert Sea, Sagarin launched a crowdfunding campaign on Rockethub, marking the first time the University officially sanctioned crowdfunding for a scientific project.
“Critters” Up for Adoption

Construction crews broke ground on the UA’s new Environment and Natural Resources 2 building in October 2013, and already roadrunners, Gila monsters, hummingbirds, and other desert critters are angling to move in.

These critters, though, are more objects of art than animate objects. Tucson-based design and fabrication firm Creative Machines captured the charisma of these and other desert animals in stainless steel inlays that will bring the building’s pathways to life.

For $60, donors can “adopt” a critter, among other designs, that will be inlaid into the concrete floor throughout the building’s five stories. “The idea is to give community members and other supporters a sense of belonging and contribution to the building,” says IE’s Deputy Director Betsy Woodhouse.

The 9- by 11-inch inlays represent 33 desert animal and plant species and also illustrate solar power, rising carbon dioxide levels, food production, and other environmental concepts, Woodhouse says.

“They are a way of connecting people with the landscape in the building and in the desert,” says Diana Liverman, who came up with the idea for the inlays after seeing the fossils in the floor at Denver International Airport. “I got stuck there for five hours once and had fun going around looking for them. We hope they will encourage people to walk around the building and get to know it.”

Scheduled for completion in June 2015, the building will include offices, classrooms, a 600-person auditorium, and gathering rooms for public programs. IE, the School of Geography and Development, the School of Natural Resources and the Environment, and some divisions of the Department of Mathematics will share the building. Designed to look like a slot canyon and echo a sense of space in the Southwest, the building will feature dramatic contrasts of light and shadow, energy efficient heating and cooling systems, rainwater harvesting and low-flow faucets, and other innovative architectural solutions in a desert landscape.
Several members of IE’s staff were honored for expanding our understanding of science and of the past, present, and future relationships between people and our environments.

Jonathan Overpeck
Thomas R. Brown Distinguished Chair

Jonathan Overpeck was recently named a Thomas R. Brown Distinguished Chair in Integrated Science by the Thomas R. Brown Foundation. The foundation seeks to honor the legacy of innovation and entrepreneurship of engineer Thomas R. Brown, co-founder of the world-renowned semiconductor company Burr-Brown Corp., which was sold to Texas Instruments in 2000, by supporting numerous grants, scholarships, and fellowships.

The distinguished chair includes a research fund, and Overpeck plans to invest the funds in his own field research on climate, graduate student support, and partnership building in the area of climate adaptation, he says. “The research fund allows me to invest more in my passion to understand what’s happening to our environment in the Southwest and beyond, and what we can do to save what we value,” Overpeck says. “I’m very honored to be one of the UA Thomas R. Brown professors.”

Scientific Contributions to Ranching and Land Management

Overpeck also received a 2013 Outstanding Leadership in the Radical Center Award from the Quivira Coalition, a Santa Fe-based organization that works to build economic and ecological resilience on western working landscapes. “Quivira is a coalition of ranchers and other land managers who realize that we have to put politics and differences aside and learn how to manage our landscapes better. Some of that involves learning how to use science to make land and livestock decisions,” Overpeck says. Each year the coalition honors a rancher, conservationist, civil servant, and researcher. Overpeck was recognized for his leadership with IE’s CLIMAS program and for contributing to the dialogue on how to better manage landscapes.

Regents’ Professor, University of Arizona

The Arizona Board of Regents appointed Overpeck as a Regents’ Professor, a title which is held by no more than 3 percent of the University’s tenured and tenure-track faculty. IE’s Diana Liverman also carries that title. An internationally recognized expert on the science and policy of climate and environmental change, Overpeck is committed to integrating science with societal issues to help promote the understanding of science.

Diana Liverman
John Simon Guggenheim Fellowship

Diana Liverman was among the 178 scientists, artists, and scholars from the U.S. to receive a 2014 Guggenheim Fellowship. She is using her one-year fellowship to write a book on poverty and climate change in the Americas. Her goal is to identify solutions that eliminate poverty, reduce emissions, and help people adapt to climate change. “I’ll ask how the poor experience the warming world and how climate policy can respond in ways that reduce the risks of climate change and move people out of poverty,” she says. Liverman is the third IE researcher to receive a Guggenheim Fellowship; Jonathan Overpeck received the honor in 2005 and Rafe Sagarin was named a fellow in 2011.

Zack Guido

Zack Guido, associate staff scientist for CLIMAS and a Carson Scholar alumnus, received several scholarships, highlighting his commitment to and aptitude for climate research and outreach: William G. McGinnies Graduate Scholarship, Arid Lands Studies, UA School of Natural Resources and the Environment, and the Horton E. Noon Memorial Scholarship and Pistor-Stanley Scholarship in Agriculture, UA College of Agriculture and Life Sciences.
IE would like to thank Kimi Eisele, a talented writer, dancer, and creative mind, for her insights and dedication to compiling this Annual Report.
Publications by IE Staff

ARTICLES


ARTICLES (CONTINUED)


REPORTS


