Drawing Lessons from a Catastrophe at “the Roof of the World”
The earthquakes that struck Nepal on April 25 and May 12 of 2015 killed thousands, destroyed hundreds of thousands of buildings, and displaced nearly three million Nepalese. The Rasuwa District, where this image was taken, was one of the worst affected districts with 98% of households reporting housing damaged, 42% of houses completely destroyed, and 47% having sustained heavy damage/partial collapse. This image shows destroyed homes nine months after the earthquakes. Many families are waiting to receive government or outside aid to rebuild their homes.

Image and cover image by Jeremy Spoon.
In the wake of the 2015 earthquakes, Dr. Jeremy Spoon traveled to Nepal to study the ways natural disasters reshape social-ecological systems. What he learned could improve the future of disaster preparedness, relief, and recovery efforts.
CAN MICROORGANISMS SAFEGUARD CHINA’S PREMIER NATIONAL PARK?

Dr. Yangdong Pan wants to know if algae in the waters of China’s Jiuzhaigou National Reserve can help preserve the natural beauty of the park’s pristine lakes and streams.

VIRTUAL WATERS

Dr. Scott Wells uses state-of-the-art hydrodynamic modeling to address surface water quality issues that affect the environment and society.

EMPOWERING PEOPLE WITH DISABILITIES IN NIGERIA TO REACH THEIR FULL POTENTIAL

PhD student Jackie Dingfelder’s exploration of New Zealand’s approach to inclusive, integrated water management practices reveals valuable insights for policymakers on both sides of the Pacific.

UNDERSTANDING CLIMATE CHANGE IN SOUTH AMERICA

Dr. Paul Loikith and graduate student Judah Detzer are analyzing South American weather and climate data to improve our understanding of climate and climate change across the continent.

CLIMATE CHANGE AT THE BOTTOM OF THE WORLD

Dr. Tucker Childs works with communities in remote West African villages, documenting the region’s endangered languages and cultures.

DOCUMENTING THE NEEDS OF PORTLAND’S HOMELESS COMMUNITY

PSU STUDENTS EXPLORE THE IDEA OF A U.S.-MEXICO BORDER WALL

HELPING PEOPLE WITH AUTISM SUCCEED IN THE WORKPLACE

A COFFEE CUP FOR ASTRONAUTS SAYS IT ALL

DOCUMENTING THE INSTITUTIONAL REPOSITORY OF PSU SCHOLARSHIP

TOGETHER FOR THE LONG HAUL

DESIGNMEDIX’S MALARIA DRUG TO ENTER CLINICAL TRIAL WITH SUPPORT FROM NIH

PORTLAND DRAWS MORE DIVERSE MIGRANTS, BUT LOSES AFRICAN AMERICANS

RESEARCH SNAPSHOT: AWARDS, PROPOSALS, EXPENDITURES DATA
The exciting projects featured in this issue showcases the global reach of PSU research. While PSU expertise spans many continents and disciplines, the people and projects highlighted in this issue underscore the particular contributions our faculty and students are making to understand and address the complex interplay between social and environmental systems.

Anthropologist Jeremy Spoon brings a social science perspective to a particularly urgent and timely question: how do cultural and social factors impact adaptive capacity, particularly the ability of communities to be resilient in the face of natural disasters? Working with faculty and graduate student collaborators from Nepal, Spoon studies communities impacted by the 2015 earthquakes in some of that country’s hardest hit districts. By developing a model that governments and NGOs can use to better understand the interplay between social, environmental, and cultural systems, Spoon is hoping to improve preparedness, relief, and recovery efforts in future disasters.

The delicate relationship between social and environmental systems is also clear in the work of Environmental Science Management professor Yangdong Pan in China’s Jiuzhaigou National Reserve. This UNESCO World Heritage Site, known for its natural splendor, has become a popular tourist destination, but this increased human presence threatens the pristine beauty that has made it so popular. Collaborating with U.S. and Chinese colleagues, Pan is developing tools to monitor water quality in order to provide early warnings of nutrient enrichment that could trigger the introduction of invasive species and habitat deterioration.

In a very different environmental and social context, Civil and Environmental Engineering professor Scott Wells brings his expertise on hydrodynamic modeling to study the potential impacts of a project to convey water from the Red Sea to the Dead Sea. His report warns of significant threats to ecosystems, with impacts that would likely be socially unacceptable.

PhD student Jackie Dingfelder describes water management as one of the “wicked problems” of public policy because of its persistence, complexity, and scale. Studying how science, policy and government intersect, Dingfelder’s research on New Zealand’s unique water management practices provides insights for policy makers closer to home. Dingfelder is in a particularly good position to help translate these insights into applications in Oregon, having previously served as a member of the Oregon State Senate and House of Representatives.

This issue also features geology and biology faculty research on Antarctica documenting the impacts of global warming. This research shows the “ecological ripple effect” of warming temperatures, ice melts, moss growth, and rising sea levels.

Understanding the interplay of human and environmental forces is also at the heart of PSU research on climate science. Geography professor Paul Loikith and graduate student Judah Detzer are working on modeling weather patterns throughout South America. Their work contributes to our understanding of weather trends and how human forces are contributing to these observed patterns.

Cultural vitality is a key theme in the research of linguist Tucker Childs. Working with researchers at the University of Sierra Leone, Childs is documenting the Sherbro language, an endangered and poorly documented language in West Africa. This research will help Sherbro communities develop pedagogical materials to preserve and revitalize their language and culture.

Inclusive public policy is the theme of Dr. C. Jonah Eleweke’s research on disability rights in Nigeria. Dr. Eleweke’s recent report finds that Nigeria lacks laws ensuring the rights of Nigerians with disabilities, as well as a lack of access to services and education for this population.

Finally, PSU architecture students Alex Ruiz, Genevieve Wasser, and Janna Ferguson recently traveled the length of the U.S.-Mexico border, assessing the feasibility of a border wall accounting for structural, environmental, and social impacts of the proposed wall.

It is inspiring to see our faculty and students taking up these “wicked problems” through interdisciplinary and collaborative research. Their findings will continue to contribute in meaningful ways to public policy and applied problem solving. International research engagements enhance the reputation of the university at home and abroad, and provide rich opportunities for our students to learn about and contribute to solving the global challenges we will face together.

Margaret Everett
Vice Provost for Internationalization,
Dean of Graduate Studies
In the wake of the 2015 earthquakes, Dr. Jeremy Spoon traveled to Nepal to study the ways natural disasters reshape social-ecological systems. What he and his team learned could improve the future of disaster preparedness, relief, and recovery efforts.

Landslide in Gorkha District covering a trail. Gorkha was the epicenter of the April 2015 earthquake. Landslides continue to be a hazard from destabilized slopes caused by the earthquakes. Image by Jeremy Spoon.
IN ANCIENT GREEK THEATER, a catastrophe was a plot device: an event near the end of a play serving as a catalyst for change.

Today, “catastrophe” is synonymous with “disaster” and describes events such as the “catastrophic structural failure” of levees in New Orleans during Hurricane Katrina, “catastrophic wildfires” in the Western U.S., and the “catastrophic meltdown” of Japan’s Fukushima Daiichi nuclear power station.

It’s rare these days to encounter the word “catastrophe” in a context in which ancient Greek theatergoers might have understood it. But that’s exactly what Dr. Jeremy Spoon, an anthropology professor at Portland State University, means when he refers to the “catastrophic” earthquakes and landslides that struck in Nepal on April 25th and May 12th of 2015, killing over 9,000, injuring an additional 22,000, and damaging or destroying more than 760,000 buildings to displace nearly three million people. Fortunately, the first earthquake struck on a Saturday when students were not attending the more than 7,000 damaged or destroyed schools.

Dr. Spoon is an applied environmental anthropologist whose research focuses on the indigenous ecological knowledge of peoples living in and around mountainous protected areas in the Nepalese Himalaya and the Western U.S. He has been conducting research in Nepal since 2004. Following the earthquakes, Dr. Spoon received a Rapid Response Research (RAPID) grant from the National Science Foundation to study how natural disasters can serve as catalysts for the transformation of social-ecological systems during recovery.

According to Dr. Spoon, social-ecological systems contain interdependencies between humans and the environment. When these systems have high adaptive capacity, they can be resilient to natural hazards, such as earthquakes. Without that capacity, systemic disruptions can result in reconfigurations of society. Called a critical transition or regime shift, this kind of change affects livelihoods and the relationships between people and the environment.

For this project Dr. Spoon is focusing his research on the states of earthquake-impacted communities before the events and at two points in time within a year and a half of the earthquakes to document the potential social-ecological reorganization and define the key social and cultural factors that determine adaptive capacity. The questions he and the research team are exploring could lead to a better understanding of catalysts for these kinds of social-environmental changes and improve preparedness and recovery efforts in future disasters.

“I focus my work on the interface of indigenous peoples with the environment,” Dr. Spoon said. “Tragic though the earthquakes and landslides were and continue to be, they provide an opportunity to apply that focus to studying how some of the hardest-hit communities are recovering while also addressing critical gaps in the literature, such as applying lessons learned from one disaster context to another, conducting replicable research over time, and bridging dialogues in the interdisciplinary literature in both the social and natural sciences.”

The project’s ten-member research team is drawn from representatives of the most affected communities, master’s graduate students from universities in Nepal, senior advisors from the international non-governmental organization The Mountain Institute, and Nepali academics. With input from local residents, Dr. Spoon and the research team carried out two research phases in 2016 during which they convened community meetings, conducted household surveys, carried out in-depth and focus group interviews with key consultants, and mapped local infrastructure and its proximity to hazards such as landslides.

The research team enrolled nearly 2,000 individuals from 400 randomly selected households in two heavily impacted districts, Gorkha and Rasuwa. Study participants were drawn from four Village Development Committees (VDCs), the Nepalese equivalent of municipalities in which residents are actively involved in local forms of governance and administration. Practically all of the participating households had their homes damaged or destroyed. In the VDCs where the research was conducted, all of the community infrastructure (including schools, monasteries, churches, hospitals, and health centers) was either damaged or destroyed. When participants were again contacted in the second phase of the research a year and a half after the earthquakes, less than half of the participants had been able to return to

According to Dr. Spoon, analysis of the data he and his team collected will shed light on the complexities of recovery and opportunities to build upon local resilience. Examples include the roles of geographic accessibility and exposure to natural hazards, shifting livelihoods, access to and reliance on external aid, the functions of various forms of social capital, participation in decentralized governance frameworks, and the value of local knowledge in recovery situations.

“All of these factors affect recovery processes,” Dr. Spoon said, “and I suspect that the degree to which they’re present or absent within a community also plays a role in social-ecological transitions dictating specific recovery outcomes. While we’re still working our way through the data we collected in Nepal, our hypotheses are that recovery is affected by the representation and integration of local views into governance and environmental decision-making, how much connectivity exists and whether there has been an exchange of ideas and information, how much livelihood diversity they have, and how much social memory exists of previous natural hazards and recovery situations.”

Though the data analysis is still underway, Dr. Spoon noted a number of clear social-ecological changes he was able to observe during his time in Nepal that could have a positive affect on long-term recovery efforts. In some communities, for example, he observed the operationalization of social capital. This involved the adaption of a Nepalese cultural tradition called Parma—a social practice of giving and taking help in labor or services for subsistence practices such as farming and herding—in which community members offered to help one another rebuild in exchange for the same or similar assistance. He also observed more civic participation through the formation of community groups, such as youth organizations, mother's groups, and credit and savings groups, where none or few had existed before. Disaster recovery efforts resulted in cases where individuals or groups temporarily circumvented traditional class or caste boundaries. There was also some evidence of conversions to Christianity in remote communities where Nepalese missionaries provided critical aid. And in some Village Development Communities, relief and recovery aid led to the development of new infrastructure projects, such as clean water initiatives, transitions from micro-hydropower to solar-generated electricity, and Internet where those services had not existed before the earthquakes.

Dr. Spoon also noted social-ecological changes that could hinder recovery in the long term. When the earthquakes and landslides damaged or destroyed schools, the education system was disrupted throughout the hardest-hit regions. In some communities, the loss of working-age adults meant that children, and girls in particular, were pulled from school to help with work at home. Lending increased, as did the number of people falling into debt traps. Some survivors desperate for building materials broke taboos and

their homes and just four of every ten damaged or destroyed buildings had been rebuilt.

The theoretical drivers of adaptive capacity to recover from natural disasters that Dr. Spoon and the research team are investigating include institutional participation, connectivity (i.e., bonding and bridging forms of social capital), livelihood diversity, the heterogeneity of resource use, and social memory, such as previous experiences with natural hazards that might mitigate the effects of the earthquakes.

Top: This landslide in Rasuwa District covered a road constructed to build a new dam and changed the course of the river, nearly causing a landslide dam and probable outburst flood. The blasting for the road may have contributed to the destabilization of the slopes. Middle: Destroyed homes nine months after the earthquakes. Many families are waiting to receive government or outside aid to rebuild their homes. Bottom: Jeremy Spoon and his team conducting a community meeting. Throughout 2016, Spoon and colleagues carried out sixteen meetings to present the research and preliminary results and solicit feedback from participating communities. Top and middle images by Jeremy Spoon. Bottom image by Alisa Rai.
made runs on limited natural resources. Many new homes and other buildings were hastily erected, most of which may need to be demolished and rebuilt to meet government building codes and avoid fines. Several working-age males also left the region in search of employment abroad. And human trafficking increased, particularly in displacement camps.

“After the earthquakes, you had folks in this liminal situation who weren’t really sure what the next step should be and who they should rely on,” Dr. Spoon said. “At the same time, you had this coming together of an unbelievable number of factors driving transitions in social-ecological systems at multiple levels. We hope to take what we’ve learned and apply it to developing a model that governments and international aid agencies can use to improve preparedness, aid delivery, and reconstruction efforts when the next natural disaster strikes. We also hope the research will uncover some of the issues in Nepal’s weak state capacity to respond to natural hazards and the haphazard organization and inequalities in aid distribution before and after the earthquakes. Lastly, our work lends itself to social and environmental advocacy through partnerships with aid agencies, Nepalese universities, and the government. Along these lines, we currently publish a photo blog with preliminary results every six months.”

The 2015 earthquakes and subsequent landslides in Nepal were nothing short of catastrophic. The loss of life, property, and livelihood were devastating for many who lived through the shaking. For many in the country known as “the roof of the world,” it must have seemed as if the roof had come down on them. But, as Dr. Spoon notes, disasters that force communities to rebuild also provide an opportunity to build back better—and not just homes, shops, and schools. Disasters of this scope and magnitude can act as a catalyst for change, leading to new connectivity in social networks, new ways of interacting with the environment, and the integration of appropriate technologies.

But what does it mean to build back better when the social and physical landscapes have changed and continue to change so radically? Will this natural disaster create additional disasters for those impacted the most? And what lessons can we take from the catastrophe in Nepal to help others when the next disaster strikes? These are the questions Dr. Spoon hopes his study of the recovery in Nepal will answer.

“Natural hazards like earthquakes don’t discriminate,” Dr. Spoon said. “They’re democratizing in that way. You can compare how they happened in different places with different social, structural, and biophysical vulnerabilities, but they still happen. That’s why disaster research is one of those rare areas where you can compare what happens in developed and developing nations. So much of the disaster research out there focuses on the event and its immediate aftermath, but the recovery process takes months. Years. My hope is that we have the opportunity to go back to Nepal next year, and again in three, five, seven, and ten years’ time to continue this work, because I really think that by examining this long but ephemeral period of recovery time, we can make disaster recovery smarter and help communities in Nepal and all over the world by being more aware of complexity of social-ecological systems and thus more informed and effective in disaster preparedness and response.”

Note: Research highlighted in this story was supported by the National Science Foundation (BCS-1560661).
CAN MICROORGANISMS SAFEGUARD CHINA’S PREMIER NATIONAL PARK?

DR. YANGDONG PAN WANTS TO KNOW IF ALGAE IN THE WATERS OF CHINA’S JIUZHAIGOU NATIONAL RESERVE CAN HELP CONSERVATIONISTS PRESERVE THE NATURAL BEAUTY OF THE PARK’S PRISTINE LAKES AND STREAMS.

BY SHAUN MCGILLIS
Few landscapes rival the beauty of China’s Jiuzhaigou National Reserve. Located in northern Sichuan Province, the park features snowcapped mountains, deep valleys, and deciduous forests that glow brilliantly in the fall. But the park’s most popular attractions are the translucent emerald- and sapphire-hued lakes and lapis-tinted streams that meander through limestone land formations sculpted over time by geological activity.

Jiuzhaigou is China’s premier national park, but this UNESCO World Heritage Site was largely unknown to outsiders before the park opened in 1984. That year, some 30,000 visitors came to experience the park’s lakes, streams, and waterfalls. Today, Jiuzhaigou receives an average of 7,000 visitors a day, with over 40,000 visitors a day arriving during peak seasons.

The park’s popularity has led some to ask: could the influx of tourists disrupt the fragile relationships between the biological, geological, and hydrological features responsible for the natural beauty that draws visitors to Jiuzhaigou in the first place?

According to environmental biologist Dr. Yangdong Pan, the challenge for park managers at Jiuzhaigou is balancing tourism, which supports the park and the local economy, with conservation efforts designed to promote long-term sustainability.

According to environmental biologist Dr. Yangdong Pan, the challenge for park managers at Jiuzhaigou is balancing tourism, which supports the park and the local economy, with conservation efforts designed to promote long-term sustainability.

Professor Pan is a faculty member in Portland State University’s Department of Environmental Science and Management. His research focuses on environmental monitoring and freshwater conservation through the study of microorganisms such as the algae that live in the lakes and streams of Jiuzhaigou.

Working in collaboration with colleagues from the U.S. and China, Dr. Pan is developing tools and methods park managers can use to monitor water quality and identify early warning signs of environmental degradation such as nutrient enrichment (eutrophication) that could change the biological and chemical balance of the park’s freshwater ecosystems. According to Dr. Pan, eutrophication can trigger system-wide transformations resulting in the extinction of keystone species, the introduction of invasive species, the deterioration of habitat, and the reconfiguration of biodiversity and biogeochemistry.

"Pristine karstic ecosystems such as those found at Jiuzhaigou have very low levels of nutrients like nitrogen and phosphorous in their waterways," Dr. Pan said. "The absence of these nutrients inhibits the growth of certain species of algae, which has a lot to do with why the lakes and streams at Jiuzhaigou look the way they do. But if you increase the nutrient level by even the slightest amount, you begin to see changes in the biota that make these waters their home and as a result the quality of the water will change. So if you want to keep the park’s waterways in their pristine state, you have to be really careful about not introducing nutrients into the ecosystem.”

But that is exactly what park managers and scientists like Dr. Pan worry is happening. The concern is that the massive crowds that visit Jiuzhaigou each year unwittingly track in nutrients that contaminate the water either by direct contact or by percolating through the porous rocks that form the foundation of the park’s stunning landscapes. Pollutants including phosphorous and nitrogen can hitch a ride into the park on shoes and articles of clothing. Other sources of nutrient enrichment include food products brought into the park by visitors as well as tourism-related waste and waste management. And while the trace levels of nutrients carried in by one person may not threaten the park’s expansive freshwater ecosystems, multiply that by 40,000 tourists a day and you increase the risk of deleterious spikes in nutrient levels that may result in irreversible damage to the park’s lakes, rivers, and streams.

For park managers the issue is often reinforced by a lack of resources to identify the early warning signs of eutrophication. Consequently, by the time they identify

“PARK MANAGERS CAN INTEGRATE OUR FINDINGS INTO THEIR DECISION-MAKING PROCESS WHEN THEY’RE DEVELOPING PLANS TO ADDRESS THE CHALLENGES CREATED BY THE DUAL MANDATE OF OPERATING THE PARK FOR TOURISM PURPOSES AND WORKING TO PRESERVE ITS PRISTINE ENVIRONMENT.”

Dr. Yangdong Pan
spikes in nutrient levels in the water, it may be too late to halt and reverse the damage.

Dr. Pan and his colleagues are working on what may be a simple, cost-effective solution to monitoring the park’s water quality for eutrophication. Because the microalgae that live in the waters at Jiuzhaigou and elsewhere have short life cycles and are extremely sensitive to changes in their environment, Dr. Pan hypothesizes that subtle changes in the composition of species of microalgae found at pristine sample sites throughout the park might indicate shifts in nutrient levels in the water. And it’s possible that those subtle shifts could alert park managers to eutrophication even before spikes could be identified in lab tests. The study is the first systematic analysis of the biota living in the lakes and streams of Jiuzhaigou and the first to consider the relation of those species to the environment and the impacts of tourism.

“The algae that grow on substrates in the waters at Jiuzhaigou are species that thrive in nutrient-poor environments,” Dr. Pan said. “By collecting samples and cataloging species we find living in pristine conditions, we can assert that these are the species we’d expect to find in a healthy ecosystem. They’re a benchmark for water quality in Jiuzhaigou.”

In several recent publications, Dr. Pan and his colleagues have demonstrated the sensitivity of species of algae collected at Jiuzhaigou to nutrient enrichment in their environments. Further findings suggest the early colonization of more nutrient-dependent species can be identified by color changes on benthic habitats in streams and lakes. While Dr. Pan notes that there are no hard conclusions yet, evidence the research team has gathered thus far suggests that the composition of algae living in the waters at Jiuzhaigou could serve as an early warning sign for nutrient enrichment. Furthermore, if trends in the data suggest a correlation between tourist activity, eutrophication, and changes in the composition of algae species present, park managers and conservationists could use that information to develop further studies exploring the relationships between tourism and ecosystem degradation in streams and lakes at Jiuzhaigou, which could lead to the development of interventions designed to mitigate the strain of nutrient loading on the park’s freshwater ecosystems.

“The work we’re doing in Jiuzhaigou will inform management practices at the park,” Dr. Pan said. “Park managers can integrate our findings into their decision-making process when they’re developing plans to address the challenges created by the dual mandate of operating the park for tourism purposes and working to preserve its pristine environment. And by working with international partners and foreign entities, we can promote the open exchange of practices and ideas, which is critical because efforts to manage our limited water resources are a concern for all countries and governments.”

Note: Research highlighted in this article is supported by the International Science and Technology Cooperation Program of China (2013DFR90607) and the Jiuzhaigou Bureau of Administration.
Dr. Scott Wells uses state-of-the-art hydrodynamic modeling to address surface water quality issues that affect the environment and society.

By Shaun McGillis

Above: The Dead Sea, cut off from its main source of inflow, is losing water from evaporation and industrial use, causing the lake to shrink by nearly a meter per year. Below: A fisherman on the Three Gorges Reservoir in China's Hubei province.
We live in a world made possible by water. Our way of life depends on it. So, to meet our water needs, we’ve built dams, reservoirs, and aqueducts. We’ve diverted rivers, siphoned springs, and tapped aquifers. We’ve created regulations and enacted policies that govern everything from who has priority rights over water supplies to removing dams to restore fish and wildlife habitat. And along the way scientists, engineers, and water district managers have come to understand that these activities affect water quality in ways that can harm the environment, disrupt supplies, and lead to conflicts between competing demands on limited resources.

“When it comes to water quality the stakes are high, for society and for the environment,” said Dr. Scott Wells. “Minor changes in temperature, flow, or chemical composition can have outsized effects, resulting in eutrophication, algal blooms, oxygen depletion, die-offs, and other potentially harmful phenomena.”

Dr. Wells is a professor in Portland State University’s Department of Civil and Environmental Engineering. His research and expertise in hydrodynamic modeling provides resource managers, scientists, and other engineers information critical to the development and optimization of surface water management strategies that seek to strike a balance between human use and the environment. Dr. Wells leads the Water Quality Research Group at PSU, a team of faculty, graduate students, and staff focused on using hydrological modeling software developed by the U.S. Army Corps of Engineers and PSU, called CE-QUAL-W2 (W2), to construct virtual models of actual rivers, lakes, and estuaries and simulate hydrodynamic processes that affect water quality.

For years, Dr. Wells and the Water Quality Research Group have partnered with local, state, and federal agencies tasked with managing surface water systems and maintaining water quality. And in another example of how researchers from PSU have extended the reach of the university’s mission to “let knowledge serve” beyond our national borders, Dr. Wells has partnered with foreign governments and international agencies assisting with the evaluation of surface water systems and helping address critical water quality challenges involving concerns including ecosystem health, wildlife habitat, and greenhouse gas emissions.

In Israel, for example, where the diversion of water from the Jordan River has nearly cut the Dead Sea off from its primary source of inflow, and local industries continue to draw from the sea’s dwindling waters, Dr. Wells participated in the Dead Sea–Red Sea Water Conveyance Study sponsored by the governments of Israel and Jordan as well as the Palestinian National Authority and the World Bank. That project explored the idea of building a pipeline or canal connecting the two seas that would provide potable water to local residents, generate electricity, and stabilize water levels in the Dead Sea.

“The Dead Sea is dying,” Dr. Wells said. “It’s already lost about a third of its surface area and water levels are dropping by nearly a meter a year. And now people are seriously asking what they can do about it.”
According to Dr. Wells, the idea was to move water from the Gulf of Aqaba on the Red Sea up the Araba Valley to the Dead Sea. The question is, however: how might the project impact the region? What could be expected as a consequence of mixing the characteristically distinct waters of the Red and Dead Seas?

Dr. Wells was invited to join the team of scientists, engineers, and policymakers evaluating potential outcomes that could result from mixing the waters of the two seas. Using the W2 software, he and his team explored possible answers to questions such as how the dynamics of stratification in the Dead Sea might change given the introduction of Red Sea water. They asked how the chemistry of Dead Sea water might change and what could happen as a result. Is there a potential for harmful algal blooms? Would surface evaporation rates differ? They even examined how Red Sea water might affect the buoyancy of visitors that come from around the world to float in the Dead Sea’s famously saline waters.

Data and results from simulations Dr. Wells generated using a specialized version of the W2 software were included in the World Bank’s “Environmental and Social Assessment” portion of the final report on the impacts of Red Sea–Dead Sea water conveyance. According to Dr. Wells, the data didn’t necessarily bode well. The introduction of Red Sea water posed potentially major threats to ecosystems supported by the Dead Sea. As the final report states, not only would those threats be socially unacceptable, but the introduction of Red Sea water to the Dead Sea would likely result in “changes to the appearance of the water quality such that its value as a heritage site of international importance [would] be damaged.” Despite concerns highlighted in the final report, the Jordanian government is moving forward with the project unilaterally with construction scheduled to begin in 2018.

Some 4,300 miles east of the Dead Sea, in China, Dr. Wells is working with collaborators from the Three Gorges University, the Hubei University of Technology, and the Institute of Water Resources and Hydropower Research to explore water management strategies that could reduce harmful algal blooms in China’s Three Gorges Reservoir on the Yangtze River in China’s Hubei province.

Studies conducted by Dr. Wells’s colleagues in China suggest algal blooms along the Xiangxi River, the largest tributary of the Three Gorges Reservoir, are closely associated with patterns of water level fluctuations. Reduced water levels in the reservoir, they observed, caused more water to flow out of the tributary. The outflow flushed surface nutrients necessary for algal blooms out of the tributary. It also resulted in vertical mixing of waters from various depths, which likewise contributed to reductions in blooms.

On the surface, the obvious solution to the problem of algal blooms in the Xiangxi would be to release more water from the

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reservoir. The issue with that solution according to Dr. Wells is that dam operators are limited to how much water they can release from the reservoir. And even if they could release enough water to affect algal blooms upstream, the loss of that volume of water would likely result in lost power generating capacity at the dam. Dr. Wells's collaborators, however, also hypothesized that it was possible to control algal booms by raising the level of water in the reservoir. Dr. Wells helped the team test that hypothesis.

"Fluctuations in water levels, whether natural or the result of dam operations can affect water quality in lacustrine systems," Dr. Wells said. “The question we're assisting our colleagues in China with is: when and how do fluctuations prevent algal blooms in the Xiangxi River side arm of the Three Gorges Reservoir? And what, if anything, can the dam operators do to improve water quality in the side arms of the reservoir?"

By running simulations of the hydrodynamics and water quality in the Xiangxi tributary, Dr. Wells hoped to identify management strategies that officials at the reservoir can use to incorporate environmental decision-making into the everyday operational practices of the dam and reservoir and reduce some of the trade-offs between improving water quality and reducing environmental degradation upstream and generating power, controlling for floods, and providing for irrigation at the dam.

Hydrodynamic and water quality simulations produced by Dr. Wells and the Water Quality Research Group corresponded to field observations recorded by the Chinese scientists and illustrated how various water management strategies at the reservoir resulted in subsurface circulation that altered the thermal and chemical stratification of the water. The results showed that raising the level of water in the tributary was indeed an effective strategy for reducing algal blooms, provided that the water flowing into the side arm of the reservoir came from the Xiangxi River and not from the reservoir. So under the right conditions in which there is inflow from the tributaries, Dr. Wells found, it is possible to operate the dam in such a way as to improve water quality without compromising utility.

"Testing field observations like those recorded by my colleagues in China is just one of the functions we're able to use the W2 software for," Dr. Wells said. “We’ve adapted this tool to simulate gas levels emanating from spillways on dams along the Columbia River to evaluate how dam operations affect fish in the river. We’ve used it to assess the amount of CO₂ and other greenhouse gases countries in South America can expect to be released into the atmosphere from hydroelectric projects after dams have been built and forests inundated. And we’ve used it to simulate river conditions in places like California, Oregon, and Washington where water temperatures are critical to salmon and other endangered species."

Whether in South American, China, the Middle East, or here in the Pacific Northwest, society as we know it would be impossible if we were unable to manage, store, and transport water to meet our needs. But where we have a hand in managing the water cycle, water quality issues often arise. That is why resource managers in the U.S. and abroad depend on scientists and engineers like PSU’s Dr. Scott Wells and the members of the Water Quality Research Group whose mission is to “let knowledge serve” and who are capable of monitoring and anticipating water quality issues, determining how those issues will affect society and the environment, and providing suitable solutions to maintaining water quality standards to meet the needs of all.

Note: Research highlighted in this article is supported by the Technology Cooperation Program of China (2014DEF70070), the National Basic Research Program of China (2014CB460601), the Fulbright Scholars program, and the World Bank.
Here in Oregon and throughout much of the Western U.S., balancing competing demands for limited water supplies is a complex and often contentious process carried out by a dizzying array of local, state, and federal agencies, many of which have distinctive mandates and purviews.

“Water management is a wicked public policy problem,” said Portland State University PhD student Jackie Dingfelder. “Wicked in that the complexity, scale, and persistence of the challenges faced by the agencies charged with meeting water quality and quantity demands of stakeholders can defy resolution.”

Dingfelder is a student in PSU’s Hatfield School of Government. In the past, she served as a policy director under former Portland mayor Charlie Hales. And before that Dingfelder was a member of the Oregon State Senate and the Oregon House of Representatives, respectively. She has over thirty years of professional experience in environmental planning and policy in the public and nonprofit sectors. At PSU, Dingfelder’s research interests are in studying how science, policy, and government intersect and inform processes that transform data and theory into practice.

According to Dingfelder, a new approach to water resource management has surfaced over the last two decades. This approach aims to overcome the wicked public policy problems associated with outdated, multiagency, command-and-control-style management schemes common in the Western U.S. Called Integrated Water Resource Management, it encourages resource managers, government officials, private industry, agricultural and commercial interest groups, and the public to work together to develop a bottom-up management framework that protects water quality, optimizes supply, and assures equitable distribution.

During her legislative career, Dingfelder was directly involved in Oregon’s successful efforts to adopt and implement a version of an integrated water resource management strategy that went into effect in 2012. In 2016, as a student at PSU, she received a Fulbright Ian Axford (New Zealand) Fellowship in Public Policy that provided an opportunity to live and work in New Zealand for seven months while studying that country’s implementation of integrated water resource management reforms.

“As a state legislator, I learned a lot about bringing seemingly disparate groups with widely varying perspectives and concerns into the process of improving water management practices. And that got me interested in how other countries were approaching integrated water management,” said Dingfelder. “When I learned of the Ian Axford Fellowship opportunity, I thought I could apply my past experiences in government to an analysis of the freshwater management reforms New Zealand had undertaken...
since 2009 that could provide policymakers and practitioners on both sides of the Pacific insights into the implementation of an integrated water resource management strategy.”

Dingfelder spent the latter half of 2016 embedded with New Zealand’s Ministry for the Environment, the agency responsible for providing guidance and direction to regional councils that create water management plans. She also worked closely with Victoria University’s School of Government in Wellington. Her research goal was to gain a better understanding of New Zealand’s national and regional approaches to integrated water resource management decision-making. Dingfelder accomplished this goal by focusing her research on New Zealand’s collaborative water resource planning process at national and regional levels. She also assessed how the inclusion of New Zealand’s large indigenous Māori population in the collaborative water planning process was being implemented in three regional water districts on the North Island. Dingfelder’s final report, “New Zealand’s Approach to Integrated Freshwater Management with a Focus on Indigenous Interests,” was published by Fulbright New Zealand.

According to Ms. Dingfelder, New Zealand’s approach to freshwater management is quite different from approaches common in Oregon and the Western U.S. In New Zealand, for instance, catchment areas, or watersheds, form natural boundaries of water districts. In Oregon, on the other hand, as is the case in many other regions in the Western U.S., water districts are drawn along political lines that consider among other factors priority rights over freshwater supplies and often overlap catchment areas. As a result, multiple water districts in Oregon often share the responsibility (and the associated challenges) of managing a single watershed, maintaining water quality, and delegating water resources to stakeholders, whereas in New Zealand a single district is responsible for the management of their entire catchment area.

Dingfelder also noted a difference in management structures. Whereas Oregon’s freshwater resources are managed from the top down with rules and regulations coming from federal, state, regional, and municipal agencies, New Zealand has adopted a bottom-up approach in which a decentralized planning structure allows for decision-making at the local level by regional councils with members representing the water management community, the public, and the indigenous Māori population.

“Creating a water resource management structure that brings in members of the Māori community and makes space for their perspectives and traditions is an innovative step,” Dingfelder said. “Traditionally, water planning is very top-down; dominated by scientists and engineers, and data-driven. New Zealand has tilted that model on its side by adopting an integrated strategy that’s collaborative, place-based, and merges cultural and community priorities with scientific data at the watershed scale. It’s a unique lens through which to view water resource management and it creates mutual learning opportunities for scientists, engineers, policymakers, and the public (including the Māori population) to participate in. It’s a process I think we could apply to natural resource planning in the Western U.S.”

Having studied New Zealand’s approach to freshwater reforms and integrated water resource management strategy, Dingfelder noted that collaborative decision-making like that practiced at the catchment level in New Zealand requires partnerships with strong foundations, investments of time and resources to build the capacity of all parties involved to effectively participate in the planning process, and a willingness to be open to diverse worldviews. Her work will inform freshwater resource managers in New Zealand as they continue to move forward with the implementation of their integrated water resource management plan and could prove useful here in Oregon as the state begins updating its water resource management strategy in 2017.

“It takes much longer to bring a group together, educate them, and walk them through the collaborative process than to just go to the council, have planners write a plan, get feedback from administrators and enact policy, which is how we’ve historically done things in Oregon,” Dingfelder said. “But I think it’s worth the effort to bring everyone together to manage our freshwater systems from the bottom up. And that’s already going on to a certain degree in cities like Portland that do a fairly decent job gathering community input on policy matters. But I think we could do better at all levels of government when it comes to including communities in the planning process. I think the lessons I learned from studying New Zealand’s freshwater reforms could help guide efforts to improve collaborative resource management in Oregon.”
Dr. Paul Loikith and graduate student Judah Detzer are analyzing South American weather and climate data to improve our understanding of climate and climate change across the continent.

By Shaun McGillis
While climate scientists agree the earth is warming and human activity is a major contributor to climate change, many are still working to understand the relationships between naturally occurring climate variability and global warming and how those relationships affect weather patterns and extreme weather events locally and regionally around the world.

Portland State University geography professor and climate scientist Dr. Paul Loikith and Judah Detzer, a graduate student and research analyst, are collaborating with researchers at the University of California, Los Angeles (UCLA), to better understand how natural climate variability and climate change are evolving across the continent of South America.

Specifically, Dr. Loikith and Detzer are exploring how major climate drivers such as the El Niño Southern Oscillation, the Antarctic Polar Vortex, and the Atlantic Multidecadal Oscillation influence observed weather patterns throughout South America. It’s research they’ll use to create a spatial and temporal picture of average, natural climate variability over the continent. That work, in turn, will inform researchers at UCLA analyzing South American climate trends. Led by Dr. Roberto Mechoso, the UCLA researchers are asking if those trends are outside the range of natural variability and trying to determine whether trends in the observational record are attributable to identifiable anthropogenic forcings such as well-mixed greenhouse gases, land-use changes, and black carbon aerosols.

“To our knowledge, this is the first study to holistically and systematically examine natural climate variability and the evolution of climate change over the entire continent of South America and then to ask if we can attribute variations from the norm to specific human activities driving observed climate trends,” said Dr. Loikith.

According to Dr. Loikith, who heads the Climate Science Laboratory at PSU, understanding average natural climate variability over time requires combing through and making sense of an enormous cache of reanalysis data: an aggregation of historical, place-based meteorological data recorded at locations throughout the continent multiple times a day over the course of many years, as well as observational data. In the lab, graduate student Judah Detzer develops algorithms that sort through the reanalysis data and additional data from observations and climate models, producing maps that illustrate how natural phenomena such as an El Niño affect temperature, precipitation, and atmospheric pressure throughout all South America. Once the data have been analyzed, aggregated, and adjusted to account for uncertainties, Detzer and Loikith can use their findings to make generalizations about natural climate variability anywhere on the continent.

“In our approach to the research, we’re looking at top-down mechanisms that drive climate at large scales—things like El Niño,” Dr. Loikith said. “We’re also analyzing climate and weather from the bottom up, looking at regional and local-scale data for things like temperature, wind, precipitation, atmospheric pressure, and other factors that drive variability regionally and may affect local climate and weather.

And, when we put these pieces together, we’ll have a more comprehensive understanding of natural climate variability and that will inform the efforts of our partners at UCLA who are exploring whether they can identify if specific human activities are contributing to observed variation and trends in climate over the continent.”

Once we understand the key mechanisms for climate and weather variability over South America, Dr. Loikith noted, climate scientists will be able to ask other complex questions such as: are the current state-of-the-art climate models used to project future climate under a range of anthropogenic forcings producing reliable data? And will certain types of weather patterns and weather extremes become more prominent in South America as the planet continues to warm?

“That’s the end goal we’re working towards,” Dr. Loikith said. “We want to get to a place with our understanding of natural climate variability over South America and with our climate models where we have a baseline to measure climate change against and methods to systematically detect, attribute, and understand the anthropogenic factors contributing to changes in climate and weather patterns.”

Note: The National Science Foundation (1547899) supported research highlighted in this article.
CLIMATE CHANGE AT THE BOTTOM OF THE WORLD

WHAT ANTARCTICA IS TELLING US ABOUT OUR WARMING PLANET.

WRITTEN BY CHELSEA BAILEY AND JOHN KIRKLAND

WHILE PORTLANDERS were huddled against the rain and gloom in the winter of 2001-2002, Antarctica was experiencing an unusual warm spell. A sudden temperature rise in East Antarctica’s McMurdo Dry Valleys—one of the most arid places on Earth—caused glaciers to melt and triggered massive flooding.

About the only life found in that part of the continent are microbes in the soil. “There are no penguins. No birds. Nothing,” says Andrew Fountain, a PSU geology professor who recently coauthored a paper on the impact of the warming event. When the floods came, the microbe population bloomed along with phytoplankton in nearby lakes, and stayed at unusually high levels for the next five years.

The warming event affected life in other parts of the continent, too. Snow that was usually firm on the Antarctic Peninsula near South America became wet and sloppy, destroying the nests of Adélie penguins and causing their numbers to decline. Another species, the Gentoo penguin, flourished because they breed later in the season when there’s no snowmelt flooding.
Rising sea levels are kind of abstract,” Fountain says. “But dying baby penguins—that’s pretty tangible.”

In a kind of zero-sum ecological game, one species’s loss is another’s gain. For example, global warming is good for krill, which is good for whales. But at the North Pole, polar bears are endangered because their habitat is melting away.

“With climate change, it's not a matter of good or bad, but winners or losers,” Fountain says. “The climate is changing. Whether or not you like the change is up for you to decide.”

A NUMBER of PSU researchers (in concordance with scientists from all over the world) have found Antarctica to be one of the world’s best laboratories for studying the effects of climate change. Some thirty countries operate seasonal and year-round research stations on the continent, which is roughly the size of the United States. Antarctica is a hostile landscape that locks up millions of cubic miles of ice, and where biological activity is sparser than in warmer parts of the globe. With global warming, all that is changing. And the change is visible.

Brad Buckley, PSU biology faculty, has traveled to Antarctica seven times in the past sixteen years studying the effects of warming on fish. He’s found that it doesn’t take much change to have a dangerous impact on the health of the fish he’s studying. At the same time, other species, including king crabs, are moving in—just one effect out of thousands that result from small changes in temperature. He sees more consequences on the horizon.

“We’re worried that the sea ice is going to be thinner—that it’s going to form later and break up sooner than usual,” he says. “When you do that, you disrupt the base of the Antarctic food web, which is the algae that grows on the bottom of the sea ice. Tiny grazers eat the algae, and fish eat the grazers. If we start seeing a significant loss of sea ice in the Antarctic, it’s going to have major ecological ripple effects.”

Meanwhile, biology faculty Todd Rosenstiel and Sarah Eppley are in the second year of a three-year project with the Chilean Antarctic Institute to study mosses on the Antarctic landscape. Rosenstiel says it’s the largest global warming experiment in Antarctica, based on the number of experiment installations. The team set up sixty open-topped chambers that operate like mini greenhouses over mossy areas. The chambers raise the temperature two degrees—a number selected to align with the Paris Agreement’s mandate to reduce carbon emissions and keep global temperature increases this century to below two degrees—and provide scientists a glimpse of how further warming might impact the antarctic ecosystem.

The experiments are taking place on an island off the coast of the Western Antarctic Peninsula, where mosses and lichens are spreading over vast areas once covered by glacial ice. It’s warming faster than almost anywhere else on Earth. Rosenstiel says there are 110 species of moss in Antarctica, including the moss commonly found on Portland rooftops.

The presence of moss is an indicator that the Earth is warming, but it’s also a harbinger of even more rapid change. Moss absorbs the sun’s heat and warms the underlying soil, creating conditions that invite even more plants. Also, there’s a possibility that the presence of moss may affect the precipitation cycle, helping to create more rain.

“It’s beginning to rain in the Western Antarctic Peninsula and nothing melts ice quicker than rain,” Rosenstiel says.

Mosses are opportunists and, as glaciers continue to retreat, Rosenstiel says, “Antarctica is theirs for the taking.”

And the more the moss spreads, the more the ecosystem will change, with some species likely to move down from South America. Eppley says the team is already seeing the spread of flowering plants, and they’ve even observed a winged insect.

FOR ANDREW FOUNTAIN, Antarctica is an ideal place to study glaciers, which is his specialty. Melting glaciers are the source of water that is already causing sea levels to rise. There are three main places to study them: mountains, Greenland and Antarctica. Mountain glaciers are retreating, but at a steady rate. By contrast, the melting in Greenland and Antarctica is accelerating, he says.

The kind of extreme weather event that triggered the flooding in the McMurdo Dry Valleys is happening more frequently, and is not confined to Antarctica. “There was a really warm event in Greenland at about the same time,” he says.

All of which is setting the stage for a new Earth, one that is changing before our eyes.
EMPOWERING PEOPLE WITH DISABILITIES IN NIGERIA TO REACH THEIR FULL POTENTIAL

By Shaun McGillis

In late 2006, members of the United Nations adopted the Convention on the Rights of Persons with Disabilities. The Convention codified the rights of persons with disabilities, stipulating, “all categories of rights apply to persons with disabilities,” and identified “areas where adaptions [had] to be made for persons with disabilities to effectively exercise their rights.”

In the decade since its introduction, 164 countries, not including the U.S., have ratified the treaty. And yet, despite overwhelming international support for the Convention, persons with disabilities in countries around the world are still denied rights including access to justice, healthcare, education, and employment. And they continue to encounter discrimination and barriers restricting them from participating in society on an equal basis with others.

At Portland State University, researchers in departments including the Regional Research Institute for Human Services, the School of Social Work, the Department of Speech and Hearing Sciences, and the Department of Sociology have worked alongside persons with disabilities to address critical issues. Assistant Professor Dr. C. Jonah Eleweke is among the cadre of faculty contributing to the university’s portfolio of research supportive of the rights of persons with disabilities in the U.S. and abroad.

Dr. Eleweke coordinates PSU’s Department of World Languages and Literatures’ American Sign Language and Deaf Cultures program. Dr. Eleweke’s research interests include second language teaching and learning, special education, supporting families of young children with special needs, access to services by people of color with special needs, and the challenges of providing meaningful services to people with disabilities in developing countries. Dr. Eleweke recently coauthored two papers detailing findings of studies exploring challenges Nigerians with disabilities face in their attempts to achieve their full potential as contributing members to society and the barriers they confront along the way.

“The Nigerian government ratified the UN Convention on the Rights of People with Disabilities in 2010,” Dr. Eleweke said, “and the Nigerian National Assembly passed laws protecting the rights of Nigerians with disabilities. So you would think the rights of Nigerians with disabilities would be protected and they would be empowered to reach their full potential. But the legislation was never signed into law by the president. As a result, many challenges persist and Nigerians with disabilities still encounter critical barriers.”

The impact of the lack of federal laws assuring the rights of Nigerians with disabilities is highlighted in “Challenges of Empowering People with Disabilities in Nigeria for National Development,” published in the Journal of Special Education and Rehabilitation. In the paper, Dr. Eleweke and his coauthor review the available research related to issues including legislative mandates on provisions of service to individuals with disabilities in Nigeria, funding for services, and access to education. Their analysis suggests that the absence of legal protections preserving the rights of Nigerians with disabilities, coupled with inadequate funding for programs and improvements to infrastructure and a lack of effective, inclusive programming, makes it difficult for many to attain a quality education, enter the workforce, access healthcare, and travel from place to place.

Those findings are echoed in “Barriers to Accessing Services by People with Disabilities in Nigeria: Insights from a Qualitative Study,” published in the Journal of Education and Social Research. Framing disability as an oppressive social creation rather than as the effect of an individual impairment, the study found that Nigerians with disabilities have similar stories to tell about their experiences navigating society. Common themes that turned up in Dr. Eleweke’s review of interviews and responses to questioners included difficulty physically accessing classrooms, workspaces, public transportation, and health centers; a lack of personnel and resources to support learning and working for persons with hearing and visual impairments; and attitudinal barriers hindering access to education and the workplace. Asked what factors they felt contributed to the barriers they identified, members of the sample group cited the lack of legislation guaranteeing the rights of persons with disabilities, the absence of a legal framework enabling Nigerians with disabilities to argue their case in their fight for their rights, and the need to unite and coordinate advocacy efforts supporting persons with disabilities in Nigeria.

“The people want to have their voices heard,” Dr. Eleweke said. “They want to contribute to society and to be able to access education, healthcare, and employment opportunities. They want to increase the public’s awareness of the barriers they face and to show them what they can contribute to society.”

As Dr. Eleweke noted, the UN Convention on the Rights of Persons with Disabilities provided countries around the world a top-down framework for insuring the rights of persons with disabilities and empowering them to achieve their full potential, but the implementation of that framework often requires bottom-up, grassroots efforts. According to Dr. Eleweke, in Nigeria that means that Nigerians with disabilities need to continue to organize and to make their voices heard in order to enact laws that guarantee that they are free to participate in society on an equal basis with others and that they have a legal means to seek redress when they encounter physical, psychological, social, or resource barriers that stand in the way of their attaining their full potential.
Over the past century, global biodiversity has declined at an alarming rate, raising concerns of a worldwide extinction crisis in the twenty-first century. At the same time, a similar crisis is affecting linguistic diversity. And, while the latter has received considerably less attention, the situation is dire: linguists around the world warn of a looming mass extinction of languages and the cultures that use them in the decades ahead.

The Endangered Languages Project, a website originally developed by Google and managed by the First Peoples’ Cultural Council and a team of linguists at the University of Hawaii at Māona, considers a language “endangered” when children no longer learn it as their “mother tongue” at home. And while there are various reasons a language may not be transmitted from one generation to the next, linguists typically refer to the process as “language shift,” a social phenomenon in which a community replaces one language with another.

According to the Endangered Languages Catalogue, which provides information to the Endangered Languages Project, the world is losing roughly one language every three months. Such an unprecedented rate of loss could result in the extinction of between fifty and ninety percent of the world’s languages by the end of the century.

“We’re losing languages and the cultures encoded within them all over the world,” said Dr. Tucker Childs, chair of Portland State University’s Department of Applied Linguistics. “You can travel almost anywhere and find languages that have been pushed to the periphery of society by social and ecological changes that tend to support majority languages. Throughout the world you find languages that have fallen out of favor with speaking communities who see greater advantages and more opportunities for speakers of more popular regional or European languages. On every continent except Antarctica there are scores of languages with just a handful of speakers remaining. In many cases, when those speakers are gone, their language will be, too.”

For two decades, Dr. Childs has documented and archived languages of West Africa. He conducts much of his research in remote villages in Liberia, Sierra Leone, and Guinea, where his work has been critical in efforts to preserve and revitalize endangered languages in the area including Mani, Bom, Kim, and presently Sherbro. Childs is continuing that work this year, traveling among several coastal communities and islands on the central coast of Sierra Leone to document the language and culture of a people who call themselves the “Bolom” and are known to the world at large as the “Sherbro.”
“Sherbro is an endangered and poorly documented language,” Dr. Childs said. “Fewer and fewer children learn it at home. People are adopting other more widely used and favored languages spoken in the region. As a result, we’re observing a massive language shift that could result in the loss of the language within a generation or two.”

Working with the Sherbro people, fellow researchers, and colleagues from the University of Sierra Leone’s Fourah Bay College, Dr. Childs’s project is to record the Sherbro language and culture before they disappear. According to Childs, the team will document people using Sherbro in as many contexts as possible. In addition to cataloging the language, creating a dictionary of Sherbro, and preparing a grammar, the team will document traditional genres including song, music, and dance using audio and video recordings as well as photography. The research plan includes documenting daily activities such as fishing, food preparation, and social interactions between residents of the island and surrounding areas. The recordings will be transcribed, translated, annotated, and preserved for future study and use. The project includes the preparation of Sherbro language pedagogical materials the Sherbro people can use to preserve and revitalize their language should they choose to. Throughout the documentary phase of the study, Childs and his team will train members of the community to develop local capacity to continue supporting the language after the fieldwork is complete and the research team has left. All the materials collected and produced by Dr. Childs and his team will be given to the Sherbro people and Fourah Bay College, and cataloged in the archives of the School of Oriental and African Studies, University of London.

“It is critically important to preserve the world’s endangered languages,” Dr. Childs said. “These languages contain generations of cultural and ecological knowledge and present a part of a diversity that we don’t want to lose. That knowledge can lead us to discoveries and insights into our past, present, and future. Languages like Sherbro can help us understand who we are as human beings. It is also a core part of its speakers’ identity.”

There are roughly 7,100 languages in the world today. And yet, half the global population, some 3.7 billion people, communicates using just twenty-three of those languages. Of the remaining 7,077 languages, some have fewer than ten speakers, while others have as many as 100,000. For many of those languages revitalization is out of the question.

There is a danger that, as linguistic diversity declines, social homogeneity will increase, leaving us with fewer words and concepts with which to explore the richness of humanity and the world. Though the world’s linguistic diversity is vanishing at nearly the same rate as its biodiversity and in many of the same places, there are linguists like Dr. Childs and other conservationists endeavoring to preserve our linguistic diversity. They do so both by encouraging the revitalization of languages, just as one might revitalize an ecosystem, or by preserving and cataloging languages for future generations, just as one might store seeds in a seed bank. It is because of their work that future generations will be able to study the cultural and linguistic diversity of the twenty-first century even if many of those languages and cultures have been lost.

Note: The Hans Rausing Endangered Languages Programme at the School of Oriental and African Studies, University of London (MDP0316) supported research highlighted in this article.
Portland State architecture students Alex Ruiz, Genevieve Wasser, and Janna Ferguson recently took two weeks to drive the length of the Mexico–U.S. border in order to assess the border wall proposal, which President Donald Trump has said he and his administration are in the early stages of planning. The trip was the first step in their respective master’s theses projects and was supported by a $2,000 scholarship awarded by the Rudy Barton Travel Fellowship.

“The wall is impossible from a natural resources, as well as from a purely physical standpoint,” Wasser said. One reason the group cited for the impracticality of the wall was that much of the border lies on flood plains, and that floods, which regularly cause damage to structures currently in place, would threaten the structural integrity of a future wall and likely pose costly challenges to those tasked with its upkeep.

According to Alex Ruiz, the students decided to explore the region and the potential for a border wall as a part of their master’s thesis during the run-up to last fall’s election when the then presidential candidate first proposed building the wall. The group explained that the project was conceived when Trump began denouncing people of Mexican and Latin America heritage and promising to erect a wall during his campaign.

The project is titled “Architecture as Migration: Rerendering the U.S.–Mexico border through the Act of Storytelling.” In addition to studying the physical, environmental, and financial challenges associated with building a wall, the graduate students also gathered stories about what life is like in the border regions where the proposed wall might be built. They also asked how a future wall might impact the social structures of border communities.

The group explained that many of the towns on the border form “integrated communities”: towns and cities that straddle the border in which people living on the U.S. and Mexico side depend on one another for economic and social support. The group cited specific towns in the region where residents take pride in the fact that their communities occupy both sides of the border.

Currently there are around 700 miles of fencing along border. Other security measures include U.S. surveillance blimps, border patrol, and U.S. military personnel. Still, there are vast distances along the U.S.–Mexico border where the only physical barrier is the rugged desert landscape and where monitoring the border remains a challenge.

Another barrier standing in the way of the proposed wall is privately owned land, including land belonging to members of the Tohono O’odham Nation whose reservation in southwestern Arizona crosses the U.S.–Mexico border. In a recent presentation highlighting their findings, the team noted that the sovereign peoples of the Tohono O’odham Nation have issued statements condemning the wall, saying that they do not plan to allow construction on reservation lands.

Associate professor of architecture Jeff Schnabel is advising the graduate students during their project.

“What the students were doing as they traveled the border was only the beginning of the research they’ll do as they start to formulate their thesis,” Schnabel said. “The heavy lifting will happen between now and May.” Professor Schnabel noted that in the coming months the group is expected to “take a full spectrum of information, including their travels, and translate this into proposals for the built environment.”

Wrapping up their statements, the students noted that the trip “very much changed how [they] think about the border.” They said that instead of thinking of the border as just an invisible line where one country ends and another begins, they now understand that the region and the people who live there represent thriving communities with their own unique culture, communities that would likely experience social and economic turmoil if a wall were to be erected between the two nations.
Helping People with Autism Succeed in the Workplace
By Suzanne Pardington

An autistic researcher at Portland State University has received two federal grants, totaling $467,000, to help other autistic people be more successful in the workplace.

Dr. Dora Raymaker, assistant research professor in the School of Social Work’s Regional Research Institute, will lead a study to determine what helps autistic people do well professionally and develop a plan to improve their professional outcomes. Her research team will interview ninety-five people, including autistic people and those who work with them.

This study is of both personal and academic interest for Dr. Raymaker, whose own path to professional success has been an unconventional one. She says she faced discrimination, multiple career shifts, and a disability services system often ill-equipped to provide support in skilled settings before finding an academic home at PSU and profession that values her abilities.

“I want to make the way easier for people who come after me,” Dr. Raymaker said. “This is not only a culmination of my life, but it’s also something incredibly important for the community.”

Raymaker received a two-year, $417,285 grant from the National Institutes of Mental Health and a $50,000 pilot grant from PSU’s BUILD EXITO, an undergraduate research training program funded by the National Institutes for Health.

Autism affects an estimated one percent of the population and is considered a “spectrum” that includes a wide range of cognitive and verbal skills. Little research has been done on what helps autistic people be successful in professions, even as more autistic children grow up and join the workforce.

Raymaker started the Academic Autism Spectrum Partnership in Research and Education ten years ago with Christina Nicolaidis, a social work professor at PSU and physician at Oregon Health & Science University, to fill the gap between what the autistic community wanted from research and what researchers were delivering. They use a model of community-based participatory research to ensure that autistic people aren’t just studied, but also are involved in all phases of the study.

Note: The National Institutes of Health (R21MH112038) sponsors research highlighted in this article.

Who Cares if Married Women Change Their Names?
By Suzanne Pardington

Hillary Rodham changed her name to Hillary Clinton after it was suggested her last name was one reason Bill lost his reelection bid for Arkansas governor in 1980. More than three decades later, does it still matter if married women keep their names?

Only to low-educated men, according to a new study in Gender Issues by Emily Fitzgibbons Shafer, an assistant sociology professor at Portland State University.

In a national survey of 1,242 people, Dr. Shafer presented a vignette of a fictitious married woman, Carol, who is working extra hours in hopes of a promotion. Survey respondents were randomly assigned one of three variations on Carol’s last name: Sherman, Sherman-Cook, or Cook. Bill Cook, Carol’s husband, is feeling burdened by her absence and by picking up her slack in housework.

Here’s what Dr. Shafer found in her analysis of the survey data:

- Men with a high school diploma or less view women who keep their last names as less committed wives whose husbands should accept fewer late workdays and are more justified in divorcing them.
- Among men with more education and all women, surname choice has little effect on perceptions of a wife’s commitment to her marriage or the standards to which she is held.

The results are somewhat surprising but consistent with the “uneven and stalled” gender revolution, Dr. Shafer writes. “The gains women have made in the last sixty years—for example, in terms of employment and earnings—have not occurred equally across socio-economic groups or across outcomes.”

Emily Fitzgibbons Shafer, Assistant Professor, Department of Sociology, College of Liberal Arts and Sciences.
A COFFEE CUP FOR ASTRONAUTS SAYS IT ALL

The Space Cup, a zero-gravity coffee cup designed for NASA by PSU mechanical engineering professor Dr. Mark Weislogel and his colleagues, has won the 2016 Beazley Product Design of the Year prize from the Design Museum in London.

“A coffee cup for astronauts says it all,” said judge and broadcaster Loyd Grossman. “The perfect collaboration of design and tech to make anything possible no matter where you are, or even what gravitational field you are in. It may be a lot of work for such a small product, but it will make the world of difference for those that are so far from home.”

Weislogel’s team developed the cup at Portland State using experiments on the International Space Station and PSU’s ninety-foot drop tower, which mimics the effects of weightlessness. It lets surface tension replace the role of gravity so astronauts can drink from an open container, a breakthrough in the study of fluid dynamics in space.

The cup design was one of seventy nominations in six categories: architecture, digital, fashion, graphics, product, and transport. All the nominees and winners are listed on the Design Museum’s website.

One Resilient Virus

Portland State University researchers found that a certain spindle-shaped virus that infects single-celled organisms living in volcanic hot springs only needs about half its genes to infect its host. That means the virus can undergo major mutations without losing its ability to survive and infect.

The research, headed by PSU biology professor Kenneth Stedman, shows how resilient and stable viruses can be. It also gives new insights into the structure of HIV and other viruses, how they are made and the challenges of fighting them.

“If you get rid of some of a virus’s genes, you change the structure, but it can still infect,” Dr. Stedman said. “Our next step will be to find out what makes these viruses so stable, and that will give us insights into all kinds of diseases, from AIDS to Alzheimer’s.”

The viruses Dr. Stedman studied were collected in highly acidic, near-boiling volcanic hot springs. Stedman, cofounder of PSU’s Center for Life in Extreme Environments, studies organisms from such hostile conditions in order to help scientists understand the molecular basis of survivability under extreme conditions and maybe the origins of life itself.

Stedman’s study, funded by the National Science Foundation, will be featured as a Spotlight in the May 2017 issue of the Journal of Virology.

Note: The National Science Foundation (MCB0702020, MCB1243963, DMR1263339) and Portland State University supported research highlighted in this article.

BARRIERS TO SUCCESS IN STEM EDUCATION

Portland State University Sociology professor Dara Shifrer recently received an $877,836 grant from the National Science Foundation to study the effects race, poverty, and disabilities may have on American students’ success in STEM (Science, Technology, Engineering, and Mathematics) education and careers.

The five-year grant will allow Shifrer’s research team to comb through a massive federal dataset collected by the National Center for Education Statistics to identify school and teacher factors that facilitate student success in STEM fields. The federal study first surveyed students and their teachers in 2009 and then again in 2012 and 2013.

“We’re going to look for patterns and relationships that give us a picture of how student potential may develop in certain learning environments, and how race, socioeconomic status, and disabilities play into that picture,” Shifrer said.

She added that minorities and youth with lower socioeconomic backgrounds or disability classifications are underrepresented in STEM fields, just as the nation’s STEM workforce is in dire need of well-prepared candidates from a variety of backgrounds.

“It is a tenacious problem that requires persistent, innovative research attention,” she said.

The grant has the dual purpose of producing several academic papers on STEM education and giving hands-on experience in data analysis to student research teams. The first research paper, which may offer policy recommendations on improving classroom success, will likely be published within a year.

Note: The National Science Foundation (1652279) supports research highlighted in this article.

Articles by John Kirkland
People living outside in Portland struggle to meet their basic hygiene and health needs because of a shortage of showers, bathrooms, and laundry facilities, a Portland State University survey found. One possible solution: a community hygiene center that is open all day, every day.

Lisa Hawash, assistant professor of practice in PSU’s School of Social Work, led a team of researchers and graduate students in a survey of 550 people experiencing homelessness and poverty. Among their findings:

- 40 percent use public bathrooms in City Hall, libraries and the mall; 33 percent use the Portland Loo; and 32 percent use shelter restrooms.
- 40 percent have experienced harassment by police or private security.
- 21 percent have been denied access to food or services, and 22 percent have been turned away from shelters because of hygiene.
- 40 percent reported medical problems such as methicillin-resistant staph infections, scabies, lice, open sores, endocarditis, and urinary tract infections related to the lack of hygiene services.

Students in Hawash’s graduate-level poverty courses spent evenings and weekends from 2014 to 2016 surveying 550 people at shelters and other service organizations. They worked in collaboration with people experiencing homelessness to develop the research questions.

Survey respondents called for a hygiene center that could stay open at least twelve to fourteen hours a day and offer accessible showers, supplies, bathrooms, laundry facilities, and storage space. Some community organizations, such as Sisters of the Road, are advocating for a hygiene center to help meet the needs of an estimated 3,800 unhoused people in Multnomah County. A new point-in-time unhoused count was completed in February.

“We know that we are not going to solve homelessness soon, and we need to be open to and working towards many solutions,” Hawash said. “We don’t know if anyone will ever fund a hygiene center, but they can’t say they don’t know there is a need.”

Barriers to accessing hygiene services include limited hours, distance from facilities, and other issues such as long lines, the survey found. Some organization such as JOIN and Transition Projects provide showers, laundry, and bathrooms, but slots are limited. JOIN provides forty showers a day and vouchers for a laundromat. Transition Projects can offer 100 showers a day and forty-eight loads of laundry per day.
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–Marilyn Moody, Dean, PSU Library

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–Tina Anctil, Department Chair, Counselor Education

“I like that I don’t have to worry about the license or maintaining the links... I simply point my students to the [PDXScholar] archive or have them find it near the top of a Google search. As a researcher, we want our papers to be read and making them available is a key to PSU’s efforts to ‘let knowledge serve the city.’”

–Timothy R. Anderson, Department of Engineering and Technology Management

PDXOpen
To date, the PSU Library has published nearly a dozen high-quality, PSU-authored open access textbooks. Open access textbooks are digital and freely available on the web for students at PSU and beyond. PDXOpen has saved PSU students over one hundred thousand dollars. The initiative is sponsored by generous donor support, including the Office of Academic Affairs, the Alumni Association, and individual donors. (http://pdxscholar.library.pdx.edu/pdxopen/).

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PDXScholar hosts content for numerous PSU-affiliated research centers and institutes. See the repository for the full range.

- **Transportation Research & Education Center (TREC)** – Partnership with Transportation Research and Education Center to provide access to presentations, reports, project briefs, and theses and dissertations. This research spans a wide range of topics including tools to assist low-income households, racial bias in driver behavior, transportation choice, effects of light-rail transit, improving walkability, enhancing bicycle safety, and earthquake vulnerabilities of bridges. (http://pdxscholar.library.pdx.edu/trec/)

- **Oregon Sustainable Community Digital Library (OSCDL)** – Extensive collection of urban documents covering growth and change in Oregon and the Portland Metropolitan Area from the 1920s through 2006. (http://pdxscholar.library.pdx.edu/oscdl/)

Most Downloaded Item of 2016
Undergraduate Honors Theses – “Social Media and Self: Influences on the Formation of Identity and Understanding of Self through Social Networking Sites” with 8,773 downloads from 137 countries. (http://dx.doi.org/10.15760/honors.64)

Collection with the Most Downloads in 2016
Portland State University Graduate Theses and Dissertations with 318,323 downloads from 221 countries. (http://pdxscholar.library.pdx.edu/open_access_etds/)

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Contact:
Karen Bjork,
Head of Digital Initiatives, PSU Library,
503-725-5889 | kbjork@pdx.edu

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100+ PSU alumni work at Daimler Trucks on Swan Island, including business grads (left to right) Yelena Ibadul, MIM ’13, Nikol Marinova ’13, Stefanie Lechner ’13, and Scott Sutton ’08, MIM ’13. Photos by NashCO Photography.
Imagine a convoy of six tractor-trailer rigs driving down I-5 so close together that the lead truck drastically cuts the wind resistance—and, thus, fuel costs—for those that follow.

Now, imagine that the trucks are driving themselves.

That’s the new reality coming out of Daimler Trucks North America, headquartered on Portland’s Swan Island. It was the first company in North America to produce a self-driving truck, one of which was prominently displayed at PSU’s Simon Benson Awards dinner in November.

Many of the bright people creating this new reality are Portland State alumni.

The university and Daimler have had a long, mutually beneficial relationship that has helped shape the curriculum of the business and engineering schools and has produced internships and high-paying jobs for grads. Daimler even bought a company started by PSU students: GlobeSherpa, a mobile app that lets users buy TriMet tickets. PSU and Daimler (formerly Freightliner) are now formalizing the relationship by forming a strategic partnership that could expand Daimler’s presence in other parts of the university.

Blake Kashiwagi, the director of mechatronics engineering, is one of the hundreds of PSU alumni working at Daimler. He earned a master’s degree in mechanical engineering at PSU in 2003. His specialty at Daimler—mechatronics—melds several interconnected engineering fields, including mechanical,
electrical, and software, for the purpose of integrating electronics with all parts of the trucks.

“We’re designing the nervous system of the vehicle,” he says.

Mechatronics is what makes self-driving trucks possible, and is a reason why Daimler is supporting a scholarship, begun two years ago, for students to study it at PSU and then go on to an internship at Daimler to apply what they’ve learned.

“When students go through that experience, they really understand the technology inside these trucks,” Kashiwagi says.

In addition to engineers, the company also employs many PSU business alumni, including Lori Heino-Royer (MBA ’02) who heads the company’s business innovation department; colleague Katie Tucker (MBA ’16); and Finian Small (’08), who works in supply chain management, a fast-growing field involved in planning and oversight of a company’s entire supply chain, from people and activities to resources and products.

“You could walk through that department and at least half the employees would be PSU alums,” says Small.

THE UNIVERSITY received advice from leaders at Daimler, Nike, Boeing, and other companies when it was designing its Global Supply Chain Management graduate degree, which launched in the fall of 2013. The executives expressed what they wanted from graduates and helped guide the curriculum.

“Daimler wasn’t looking for supply chain people who only knew traditional things like procurement, planning, and logistics. They were looking for people to think strategically, similar to what engineers are thinking about in terms of design,” says Cliff Allen, dean of PSU’s School of Business Administration. “They wanted an emphasis on leadership, which is hugely important when you’re taking a holistic view of something.”

Allen sees a long road ahead with Daimler, with the truck maker helping to keep PSU tuned in to the needs of business, and with PSU placing more and more of its graduates in the company’s Swan Island headquarters. The very fact that Allen, or any business dean, leans on outside businesses for insight is essential to keeping abreast of what the university teaches.

“At Portland State, we are very, very ingrained in the community. We can’t and should not ignore what community members need from us,” Allen says. “They very much want to be involved with us because they want talent, they want access to researchers, and they would like to understand what it is they may be missing in the world of business.”

He points out that executives from many companies, including Daimler, give guest lectures at PSU on a regular basis.

“When you go to Portland State as a student, you have access to vice presidents and CEOs in your classrooms every day. That hugely impacts your educational experience. It’s what our students want,” he says.

EMPLOYMENT at Daimler isn’t restricted to engineering and business. Stefanie Lechner, who graduated from PSU in March 2013, got her degree in applied linguistics with a minor in psychology. She’s German, and liked the idea of working for a German company (Daimler’s main headquarters are in Stuttgart). Her initial goal when she came to the United States was to become an English teacher. At Daimler, she gets to speak German and has been involved with employee training.

Lechner is one of the 1,100 people (out of 2,800 Daimler employees in Portland) working in a brand new, $150 million LEED Platinum building on the banks of the Willamette River. The inside is open, airy, and full of amenities such as ping pong tables, lounges, a fitness center, and a cafeteria that, according to Lechner, serves excellent food. The outside is nicely landscaped, and employees can recharge by taking long walks on the riverside trails.

“Work-life balance is a big topic here,” she says.

The building opened in May, taking the place of a more traditional office building.

“In the former building, everyone had their own silos,” says Finian Small. “The company’s effort is to become more flexible and open. The point of this building was to get everyone working in the same world.”

That world will include more PSU grads as the partnership between the university and Daimler continues to evolve. For Renjeng Su, dean of PSU’s Maseeh College of Engineering and Computer Science, the relationship is a natural.

“We produce two things: people and ideas. And they produce technology and products,” he says. “I see this as a very strong partnership.”

Lori Heino-Royer (MBA ‘02) is director of the Business Innovation and Program Management office at Daimler Trucks North America, where she has worked since 2001.
DesignMedix, Inc., a drug development company targeting drug resistant infectious diseases, has entered into an agreement with the National Institutes of Health (NIH) that will pave the way for first-in-human clinical trials of DesignMedix’s malaria drug DM1157.

The agreement is with the National Institute of Allergy and Infectious Diseases, part of the NIH, and builds on a strong package of preclinical data DesignMedix developed to prepare its malaria drug for clinical trials. Under the agreement, NIH will sponsor a Phase I clinical trial of the drug, which will test its safety for human use.

The trial will be conducted at Duke Clinical Research Institute in North Carolina, and is planned to commence in late 2017. The trial is expected to last about a year. Two more studies will be required before the drug can go to market—a process that will take five to six years.

“Diseases like malaria are a significant hurdle to the productivity, prosperity, and health of millions of people around the world,” said DesignMedix CEO Sandra Shotwell, noting that malaria parasites have developed resistance to almost every malaria drug currently available. “Our malaria drug is designed to overcome drug resistance. We believe it will make a positive impact on global health.”

DesignMedix is housed in the Portland State Business Accelerator, the region’s leading technology incubator and home to more than thirty promising technology and science startups. DesignMedix exclusively licensed the malaria drug technology from Portland State University where the compounds were developed by company cofounder and chemistry professor, Dr. David Peyton. The drugs were designed to have two important functions: kill the malaria parasite, and block drug resistance.

The World Health Organization has identified emergence of antimalarial drug resistance as one of the greatest challenges facing malaria control today. The U.S. Congress established a significant incentive program, Priority Review Vouchers, to encourage development of drugs for tropical diseases, including malaria. In addition to being eligible for a Priority Review Voucher upon FDA approval, malaria drug DM1157 benefits from an Orphan Drug designation (a pharmaceutical agent developed specifically to treat a rare medical condition) from the FDA.

About DesignMedix, Inc.:
DesignMedix, Inc., was founded in 2008 to develop small molecule drugs to overcome drug resistance in treating infectious diseases. In addition to the malaria drug program, DesignMedix has early-stage drug development programs for additional bacterial and parasitic diseases. For more information please visit: http://www.designmedix.com.
Portland's newest residents are more diverse than the region as a whole, except when it comes to African Americans, according to a new study from Portland State University. PSU College of Urban and Public Affairs researchers Jason Jurjevich, Greg Schrock, and Jihye Kang found that thirty-eight percent of all Portland migrants from 2012-2014 were people of color, compared to twenty-five percent of the metro's overall population. But the diversity boost came mostly from Asian, Pacific Islander, and Hispanic migrants. The Portland area lost a net of 800 African American residents in that time period, while other large metro areas recorded net gains in African American migrants.

“At this point we can only speculate on the reasons African Americans seem to be leaving the Portland area, such as the gentrification of North and Northeast Portland,” said Jurjevich, assistant director of PSU’s Population Research Center. “But evidence suggesting that African Americans are opting for other large metros merits a closer look. In the coming weeks we will release survey and interview data from Portland migrants to help contextualize migration trends.”

Portland is also drawing more immigrants from other countries that are young and college educated, the study shows. Between 2012-14, nearly one in four young people with college degrees who moved to Portland were immigrants, an increase from one in seven in 2008 to 2010.

“The data show that Portland continues to be a magnet for talented young professionals from around the world,” Jurjevich said.

The study is part of PSU’s America on the Move project, which tracks migration trends across the largest U.S. metro areas.

Other findings include:

• Every day in 2012-2014, about 300 people moved to Portland and 234 moved out, a net of 66 migrants each day.
• Portland continued to attract young, college-educated migrants, ranking sixth among the fifty largest U.S. cities.
• Domestic migrants to Portland came primarily from other parts of Oregon (26 percent), California (18 percent), Washington (13 percent), Arizona (6 percent), and Texas (3 percent).

The next America on the Move report will explore how individuals decide to move to Portland, why they stay, and how the region’s growth challenges might introduce costs that disproportionately burden people of color and young people of lower socioeconomic status.

This report compares the Portland metropolitan region against forty-nine other metro regions that, together, comprise the fifty largest metropolitan areas. The report relies on data from the U.S. Census Bureau’s Public Use Microdata Sample for the decennial population Census and the American Community Survey, accessed through the Minnesota Population Center’s Integrated Public Use Microdata Series.

About America on the Move:

The America on the Move project contains both qualitative and quantitative data that aims to better understand how human migration is changing the face of cities across the U.S. In 2012, Professors Jurjevich and Schrock began examining migration patterns of young, college-educated individuals to the nation’s largest fifty U.S. metros, from 1980 to today. By incorporating and accounting for changes in census geography for the nation’s largest metro areas, America on the Move research provides one-of-a-kind longitudinal analysis of regional migration patterns in the U.S.
Portland State University engineering professor Evan Thomas, PhD, was recently chosen by the Canadian Space Agency (CSA) as one of seventeen astronaut finalists out of an initial field of nearly 4,000 applicants. The agency will choose only two astronauts from the final pool early this summer. Canada is recruiting astronauts as it prepares to participate with space agencies from around the world in future space missions.

“I’m honored to be among the finalists,” Thomas said. “Just to be considered among these other incredible people is humbling. We have fighter pilots, test pilots, engineers, scientists, combat doctors—all from diverse backgrounds sharing a common goal.”

Thomas (pictured above), an associate professor of mechanical engineering at PSU’s Maseeh College of Engineering and Computer Science and the OHSU-PSU School of Public Health, heads a research lab that uses cellular and satellite-based sensor technology to improve clean water and sanitation in developing nations such as Rwanda, Kenya, Ethiopia, Uganda, India, and others.

“I wouldn’t be here without Portland State,” he said. “The opportunities I’ve had in my career at PSU to develop a global health research program and a technology startup company with my colleagues and students has helped me advance along the astronaut selection process.”

Thomas, who was born in Montreal, worked as an aerospace engineer at NASA’s Johnson Space Center in Houston to build experience to fulfill his lifelong dream of becoming an astronaut. He and other astronaut candidates have been undergoing rigorous, back-to-back physical and mental tests over the last ten months to prepare to become Canada’s next astronauts.

“Really, the things they’re testing on are never what they appear to be. It’s all about how we react under pressure,” he told Canadian television. “Sometimes we’re dunked upside down in a wave pool. The next minute we’re fighting a fire, or fighting a flood, or working on an Etch-a-Sketch. We never know what’s coming next.”

If CSA chooses Thomas, he will move to Houston, where he and the other astronaut selected by the agency will train with American and European astronauts. They will undergo years of training before going into space.
Research Snapshot

Second Quarter, Fiscal Year 2017

Awards by Quarter

Proposals by Quarter

Awards Received

Complete lists of awards, proposals, publications, and doctoral degrees conferred can be viewed at www.pdx.edu/research/research-snapshot
Located in northern Sichuan Province, China’s Jiuzhaigou National Reserve is famous for crystal clear waters, spectacular karstic land formations, and snowcapped alps. The park receives millions of visitors each year. But are those visitors inadvertently introducing pollutants into the park that could harm the pristine lakes and streams Jiuzhaigou is famous for? PSU’s professor Yangdong Pan is working with fellow scientists and park managers in China to find out.