

Advancing Global Sustainability through Research, Education, and Engagement

2015-16 Annual Report

SCHOOL OF GLOBAL
ENVIRONMENTAL
SUSTAINABILITY
Colorado State University





SCHOOL OF GLOBAL
ENVIRONMENTAL
SUSTAINABILITY

Colorado State University

COLLABORATION. INNOVATION. CHANGE

ABOUT THE SCHOOL



CSU's Johnson hall where the School is located

Achieving global environmental sustainability – which can be defined as maintaining the Earth's environmental quality, functionality, and services over the long-term while meeting the human needs of today and tomorrow – is one of the greatest global challenges of the coming century.

The School of Global Environmental Sustainability (SoGES) was created by Colorado State University (CSU) to address this challenge. SoGES is a Special Academic Unit attached to the Office of the Provost and Executive Vice President. SoGES connects all eight colleges at the University by providing a structure for sustainability research, education, and engagement. The School is in a distinctive position to draw upon the intellectual and innovative strengths across all of CSU to promote comprehensive, collaborative, and interdisciplinary approaches to the pressing issues that span sustainability today.

The School supports faculty in development of new research and curricula, mentors early career scientists, teaches students, and enables deeper connections across disciplinary and institutional boundaries. SoGES fosters ongoing dialogue about sustainability issues with a multitude of stakeholders from the academic, public, and private sectors. The School builds on CSU's history of leadership in environmental science and education by integrating sustainability studies with the sciences, humanities, arts, and business.

Complex and multi-faceted issues require creative management and problem solving informed by interdisciplinary understanding. SoGES advances global environmental sustainability knowledge by exploring, documenting, and teaching about the links between environmental, societal, and economic aspects of sustainability. These relationships must be addressed to effectively tackle the sustainability challenges of the 21st century, such as minimizing biodiversity loss, providing solutions to the impacts of climate change, and improving food security and social equity while meeting the needs of a human population that is projected to reach nine billion people by mid-century.

Vision

A world that is environmentally healthy, socially equitable, and economically vibrant.

Research Areas

To strategically address CSU's sustainability strengths, the School's research is organized into six subject areas: Climate Change and Energy; Food Security; Environmental Institutions and Governance; Sustainable Communities; Land and Water Resources; and Biodiversity, Conservation, and Management.

Mission

- ▶ Conduct innovative research that leads to new and deeper understanding of sustainability issues
- ▶ Provide a challenging, integrative, and provocative education that gives our students knowledge and tools that enable them to contribute to environmental sustainability
- ▶ Engage with the public, decision-makers, and other stakeholders to translate discoveries into useful information and practical solutions to pressing environmental problems

RESEARCH applying intellectual creativity to sustainability grand challenges

TO DATE:

33

interdisciplinary faculty research teams

20

faculty fellows

from 38

departments/units across 8 colleges

\$10,858,263

funding obtained by PIs from external sponsors

50+

scholarly articles, books, and book chapters published

100

Ph.D. student and postdoctoral research fellows

from 28

departments across 7 colleges

14

visiting international scholars hosted

from 9

countries

FY 2015-16:

- ▶ **7 Global Challenges Research Teams**pg. 8-11
 - \$69,000 awarded by SoGES
 - 29 faculty principal investigators from 14 departments across 7 colleges
 - 2 manuscripts published, more in development
 - \$35,000 in grants from other sponsors
 - 27 outreach events held
 - Cross-campus networks and research partnerships established
- ▶ **3 Resident Fellows**pg. 12
 - \$17,100 awarded by SoGES
 - 2 manuscripts published, more in development
 - 4 events held
 - 2 new courses developed
- ▶ **5 Visiting Fellows**pg. 13
 - 1 from Nigeria, 4 from U.S.
 - New scientific partnerships established
- ▶ **5th cohort of Sustainability Leadership Fellows**pg. 14-15
 - 20 Fellows from 14 departments/units across 7 colleges
 - 20 guest SoGES blog posts published
 - Radio show created
- ▶ **5 centers, international initiatives, and working groups**
 - Global Biodiversity Centerpg. 16
 - The Africa Centerpg. 16
 - Future Earth*pg. 17
* externally funded
 - Conservation Developmentpg. 17
 - Global Soil Biodiversity Initiativepg. 18

EDUCATION interdisciplinary learning and scholarship

TO DATE:

224	CSU graduates hold a minor in Global Environmental Sustainability
9	sustainability courses developed
1,979	students completed GES 101
277	students completed GES 470
57	courses across 7 colleges endorsed for sustainability content

FY 2015-16:

- ▶ 67 students graduated with GES minorpg. 20
- ▶ 259 students currently enrolled in GES minor from 46 different majors across all 8 collegespg. 20
- ▶ 306 students completed GES 101pg. 21
- ▶ 67 students completed GES 470pg. 21
- ▶ 1 new sustainability course developed.....pg. 21
- ▶ 2 experimental courses made permanentpg. 21
- ▶ 4 new graduate certificates developedpg. 22

ENGAGEMENT encouraging dialogue for informed solutions

TO DATE:

3,056	email list subscribers
1,300	Facebook likes
1,823	Twitter followers

Continually increasing reach through events and activities

FY 2015-16:

- ▶ 104 faculty members representing 36 departments and units across all 8 collegespg. 6
- ▶ 6 Dining with Sustainability dinners*pg. 24
* *externally funded*
- ▶ 9 events and displays held by the Student Sustainability Centerpg. 25
- ▶ 6.4% increase in website visitorspg. 26
- ▶ 239 external sustainability-related meetings held in SoGES conference roomspg. 26
- ▶ 72 hosted and co-hosted eventspg. 26-32

External Advisory Board



Osvaldo Sala (chair)

Julie A. Wrigley Professor
at Arizona State University



Joyce Berry

Former Dean of the Warner College of
Natural Resources, Colorado State University



Thomas Dietz

Professor of Sociology and Environmental
Science and Policy and Assistant Vice
President for Environmental Research at
Michigan State University



Maggie L. Fox

Past President and CEO of
The Climate Reality Project



Rob Jackson

Michelle and Kevin Douglas Provostial
Professor and Senior Fellow at the Woods
Institute for the Environment and at the
Precort Institute for Energy at Stanford
University



Kim Jordan

Co-founder and past CEO
of New Belgium Brewing Company



Thomas E. Lovejoy

Senior Fellow at the United Nations
Foundation and University Professor in the
Department of Environmental Science and
Policy at George Mason University



W. Berry Lyons

Professor and Director of the School of Earth
Sciences at Ohio State University



James B. Martin

Senior counsel Beatty & Wozniak, P.C.,
Denver, Colorado



Jonathan Patz

Professor and Director of the Global Health
Institute at the University of Wisconsin



Diana H. Wall,
Director

Diana is a University Distinguished Professor, a Professor of Biology, and Senior Research Scientist in the Natural Resource Ecology Laboratory at Colorado State University. She is actively engaged in research on sustaining soils and has spent 27 seasons in the Antarctic McMurdo Dry Valleys examining how global changes impact soil biodiversity, ecosystem processes, and ecosystem services. Diana is the 2013 recipient of the Tyler Prize for Environmental Achievement, a member of the American Academy of Arts and Sciences, and was inducted into the 2014 Colorado Women's Hall of Fame. Diana is the chair of the Scientific Advisory Committee of the Global Soil Biodiversity Initiative, was chair of the Council of Scientific Society Presidents, and past president of the Ecological Society of America and the American Institute of Biological Sciences. She holds an Honorary Doctorate from Utrecht University and received a B.A. and Ph.D. from the University of Kentucky, Lexington.



Kathleen Galvin,
Assistant Director of Education

Kathy Galvin is Professor of Anthropology, Senior Research Scientist at the Natural Resource Ecology Laboratory, Head of the Africa Center at CSU, and SoGES Assistant Director of Education. She is also an advising faculty member in the Graduate Degree Program in Ecology. Trained as a biological anthropologist, she has conducted interdisciplinary human-ecological research in east and southern Africa and central and East Asia. She is interested in issues of pastoral land use, conservation, climate variability, resilience, and adaptation strategies of people in drylands, and household decision-making under environmental uncertainty. Kathy has served on multiple National Research Council and National Science Foundation panels. She was an Aldo Leopold Leadership Fellow, and received her B.A. and M.A. from CSU and her Ph.D. from Binghamton University.



Peter W. Backlund,
Associate Director

Peter Backlund joined SoGES as Associate Director in September 2014. He was previously Director of the Integrated Science Program and Director of External Relations at the National Center for Atmospheric Research, and before that held senior positions at the White House Office of Science and Technology Policy, and the National Aeronautics and Space Administration. Peter's interests include the relationship of human activities and environmental changes; the integration of social science and natural science; assessment of climate change vulnerability, risks, and response strategies; use of scientific research in decision-making and public policy; and improving the communication of scientific information to non-technical audiences. He has helped lead scientific assessments of the effects of climate change on land resources, water resources, biodiversity, agriculture, and global food security. Peter is a fellow of the American Association for the Advancement of Science and received his B.A. from the University of New Mexico and his M.A. from George Washington University.



Eugene Kelly, Assistant Director
of Research and Development

Gene Kelly will assume the role of Deputy Director of the Agricultural Experiment Station and Associate Dean for Extension in the College of Agricultural Science in October 2016. He is a professor of pedology, has served as the head of the Department of Soil and Crop Sciences, and as the SoGES Assistant Director of Research and Development since 2009. Gene's scientific specialization is in pedology and geochemistry and his current research centers on the influence of climate change and land use on soil degradation and sustainability in water limited systems. He serves as an advisor to the United States Department of Agriculture with the National Cooperative Soil Survey and is a fellow of the Soil Science Society of America. He received his B.S. and M.S. degrees from CSU and his Ph.D. from the University of California-Berkeley.

Centers and Projects Leadership



Chris Funk
Director of Global
Biodiversity Center



Kathleen Galvin
Director of The Africa
Center



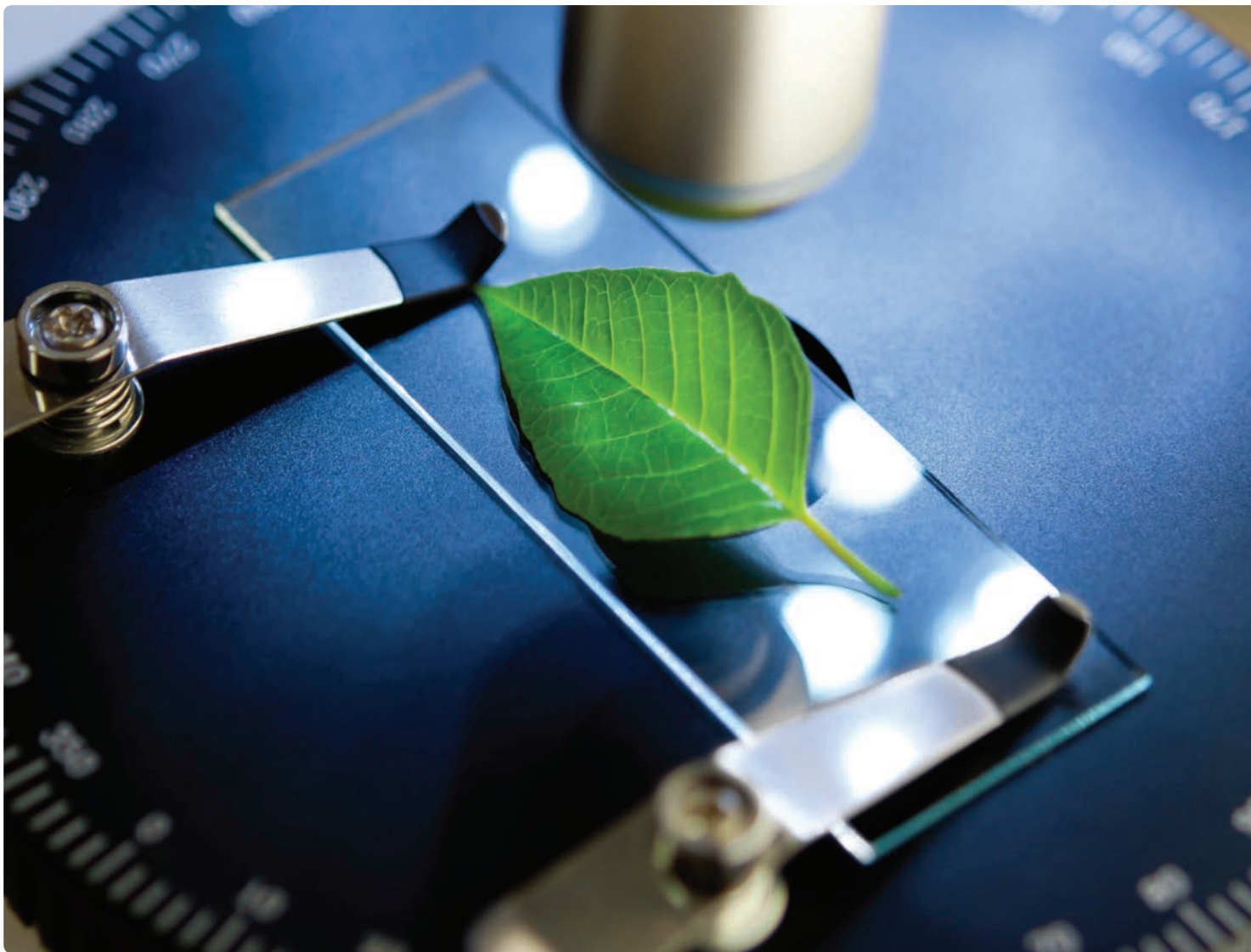
Josh Tewksbury
Director of the Future
Earth Colorado Global
Hub

FACULTY

Ruth Alexander	History	Melinda Laituri	Ecosystem Science and Sustainability
Peter Backlund	School of Global Environmental Sustainability	Jan Leach	Bioagricultural Sciences and Pest Management
Ken Barbarick	Soil and Crop Sciences	Katherine Leigh	Design and Merchandising
Jennifer Barfield	Veterinary and Biomedical Sciences	Dale Lockwood	School of Global Environmental Sustainability
Jill Baron	Ecosystem Science and Sustainability	Stephanie Malin	Sociology
Dan Beachy-Quick	English	Anthony Marchese	Mechanical Engineering
Del Benson	Fish, Wildlife, and Conservation Biology	Katie McShane	Philosophy
Michele Betsill	Political Science	Suellen Melzer	Soil and Crop Sciences
Jens Blotevogel	Civil and Environmental Engineering	Stephen Mumme	Political Science
Thomas Borch	Soil and Crop Sciences	Donald Mykles	University Honors Program
Cynthia Brown	Bioagricultural Sciences and Pest Management	Mary Nobe	Construction Management
Daniel Bush	Biology	Barry Noon	Fish, Wildlife, and Conservation Biology
Phil Cafaro	Philosophy	Troy Ocheltree	Forest and Rangeland Stewardship
Sue Ellen Campbell	English	Paul Ode	Bioagricultural Sciences and Pest Management
Martin Carcasson	Communication Studies	Dennis Ojima	Ecosystem Science and Sustainability
Michael Carolan	Sociology	Erika Osborne	Art
Joseph Champ	Journalism and Media Communication	Mehmet Ozbek	Construction Management
Suren Chen	Civil and Environmental Engineering	Merlyn Paulson	Horticulture and Landscape Architecture
Tony Cheng	Forest and Rangeland Stewardship	Keith Paustian	Soil and Crop Sciences
Jane Choi	Horticulture and Landscape Architecture	Lori Peek	Sociology
Stephanie Clemons	Design and Merchandising	Jennifer Peel	Environmental and Radiological Health Sciences
Rich Conant	Ecosystem Science and Sustainability	Liba Pejchar	Fish, Wildlife, and Conservation Biology
Daniel Cooley	Statistics	LeRoy Poff	Biology
M. Francesca Cotrufo	Soil and Crop Sciences	Jorge Ramirez	Civil and Environmental Engineering
Kevin Crooks	Fish, Wildlife, and Conservation Biology	Howard Ramsdell	Environmental and Radiological Health Sciences
Charles Davis	Political Science	Dave Randall	Atmospheric Science
Sandra Davis	Political Science	Tony Rappe	Chemistry
Tom Dean	Management	Ravi Ravishankara	Chemistry
Scott Denning	Atmospheric Sciences	Laura Raynolds	Sociology
Robert Duffy	Political Science	Ken Reardon	Chemical and Biological Engineering
Brian Dunbar	Institute for the Built Environment	Sarah Reed	Fish, Wildlife, and Conservation Biology
María Fernández-Giménez	Forest and Rangeland Stewardship	Kyle Saunders	Political Science
Emily Fischer	Atmospheric Sciences	Meagan Schipanski	Soil and Crop Sciences
Brian Foy	Microbiology, Immunology, and Pathology	Andy Seidl	Agricultural and Resource Economics
Chris Funk	Biology	Arathi Seshadri	Soil and Crop Sciences
Kathleen Galvin	Anthropology	Sybil Sharvelle	Civil and Environmental Engineering
Cameron Ghalambor	Biology	Melinda Smith	Biology
Scott Glick	Construction Management	Dimitris Stevis	Political Science
Susan Golicic	Management	Peter Taylor	Sociology
Neil Grigg	Civil and Environmental Engineering	Dawn Thilmany	Agricultural and Resource Economics
Peter Hall	Sociology	McFadden	
Elizabeth Hobbs	Horticulture and Landscape Architecture	David Thompson	Atmospheric Sciences
Thomas Holtzer	Bioagricultural Sciences and Pest Management	Bill Timpson	School of Education
Amy Hoseth	Library	Craig Trumbo	Journalism and Media Communication
Adrian Howkins	History	Rodolfo Valdes-Vasquez	Construction Management
Paul Hudnut	Management	Sue VandeWoude	Microbiology, Immunology, and Pathology
Ruth Hufbauer	Bioagricultural Sciences and Pest Management	Subhas Venayagamoorthy	Civil and Environmental Engineering
Nancy Irlbeck	Agricultural Sciences	Chandrasekar Venkatachalam	Electrical and Computer Engineering
Gene Kelly	Soil and Crop Sciences	Diana Wall	School of Global Environmental Sustainability
Raj Khosla	Soil and Crop Sciences	Ellen Wohl	Geosciences
Julia Klein	Ecosystem Science and Sustainability		
Alan Knapp	Biology		
Mary-Ann Kokoska	Art		
Boris Kondratieff	Bioagricultural Sciences and Pest Management		
Stephan Kroll	Agricultural and Resource Economics		

RESEARCH

The School invests in innovative research activities to advance global sustainability science, including cultivation of interdisciplinary partnerships, experimentation with new methods, and development of projects that integrate disparate knowledge and approaches.



Global Challenges Research Teams (GCRT)

Collaborative teams of faculty that build cross-campus partnerships to address the world's most pressing regional and global environmental issues. The program provides seed funding to foster creative and innovative approaches to sustainability grand challenges and establish interdisciplinary relationships to conduct research in new areas and with expanded applicability.

\$69k awarded **7** GCRTs **29** principal investigators from **14** departments and **7** colleges



2015-16 Global Challenges Research Team members and Resident Fellows

Hydraulic Fracturing

Studying the potential groundwater and human health impacts of surface spills containing chemicals used for unconventional oil and gas exploration.

Award: \$12,000

Principal Investigators:

Thomas Borch, Department of Soil and Crop Sciences
Yury Desyaterik, Department of Atmospheric Sciences
Jens Blotevogel, Department of Civil and Environmental Engineering
William Hanneman, Department of Environmental and Radiological Health Sciences

Research Areas: Sustainable Communities; Land and Water Resources

The state of Colorado has seen a significant increase in oil and gas development in recent years, and the vast majority of new wells are developed using hydraulic fracturing. There is growing concern about the potential impact that hydraulic fracturing may have on human health, soil, and groundwater quality, amplified by the fact that the environmental and human health risks associated with the chemicals used in fracking fluids are largely unknown. The total volume of chemicals used per well is substantial and very little is known about the environmental fate and transport of these chemicals into soils and groundwater in the case of accidental spills and catastrophic events.

In FY 2015-16, the *Hydraulic Fracturing* research team studied the impact of surface spills containing fracking chemicals on agricultural topsoil in Weld County, Colorado.

This was the first study in the United States to investigate the potential impacts on soil quality by chemicals used for unconventional oil and gas exploration. The team focused on three widely used fracking chemicals to assess not only how they broke down in the environment, but also how their breakdown was affected by interactions with other chemicals used in the hydraulic fracturing process, as well as salt, which is commonly present in large concentrations. The team found that while some chemicals were able to biodegrade over time in isolation, their breakdown was slower and in some cases impeded completely when mixed with the other fracking chemicals and/or salt, thus having a potentially larger impact on soil and water toxicity. Additionally, they found that there was increased potential for chemicals to not only remain present in the environment for a longer amount of time, but also for those chemicals to spread over larger distances and be available for crop uptake. Their research suggests that the environmental and human health risks of hydraulic fracturing must be considered not only by the existing information for individual chemicals, but also the interactions of all chemicals used; and that the soil and water contamination from fracking fluids may be greater than we currently estimate based on a single-compound basis.

The *Hydraulic Fracturing* research team published their results in *Environmental Science & Technology* and began pursuing additional funding support to continue their work.

Food Systems

Facilitating systems-based research to address the challenge of improving global food accessibility while reducing agriculture's environmental impacts.

Award: \$10,000

Principal Investigators:

Meagan Schipanski, Department of Soil and Crop Sciences
Arathi Seshadri, Department of Soil and Crop Sciences
Cynthia Brown, Department of Bioagricultural Sciences and
Pest Management

Michael Carolan, Department of Sociology
Robert Duffy, Department of Political Science
Theresa Nogeire, Department of Soil and Crop Sciences

Research Areas: Climate Change and Energy; Food Security; Sustainable Communities; Land and Water Resources; Biodiversity, Conservation and Management

Agriculture faces enormous challenges including providing sufficient, nutritious food to a growing population under global change without diminishing already stressed natural resources. In order to address the cumulative pressures on modern food systems, it is necessary to move beyond a singular focus on increasing production to include interdisciplinary research that places food production within its broader context of social, ecological, and economic systems.

The *Food Systems* research team brought together highly diverse researchers from across campus to take a holistic food systems approach to addressing the challenge of achieving global food security and reducing agriculture's impact on the environment. In particular, they addressed

how the spatial arrangement (local, regional, national, global) of different food system components influences key social, ecological, and economic indicators of sustainability. Their primary goals were to 1) connect existing CSU research efforts around production systems, community resilience, human health, biodiversity, and consumer economics with regional food and agricultural projects; 2) foster new interdisciplinary collaborations both within CSU and with other academic, public, and private institutions; and 3) position their research team to successfully compete for research funding that will establish the University as a leader in this rapidly emerging field. The team was able to establish a robust food systems network at CSU, learn from others' disciplines and ways these might inform their own work, establish new long term cross-campus collaborations, and bring together existing food systems efforts from across campus.

Key accomplishments:

- ▶ Weekly sustainable food systems seminar for 14 graduate students from 6 different departments and 8 faculty members from 5 departments
- ▶ Held 3 large events to develop food systems research networks, increase communication across the University, and for faculty to brainstorm research topics
- ▶ Wrote 2 manuscripts: 1 published and 1 in progress
- ▶ Obtained \$35,000 in support from other sources

World Wide Views on Climate Change and Energy

Convening an interdisciplinary team to discuss results from the June 6, 2015 World Wide Views on Climate and Energy 'Day of Deliberation' event and conduct academic research projects on citizen engagement and public opinion on climate change and energy issues.

Award: \$10,000

Principal Investigators:

Michele Betsill, Department of Political Science
Tony Cheng, Department of Forest and Rangeland
Stewardship

David McIvor, Department of Political Science

Research Areas: Climate Change and Energy; Environmental Institutions and Governance

With looming challenges for policymakers and stakeholders to confront the issues of climate change and energy production, global citizen input in governance decisions is largely absent from discussions. Lack of opportunities for citizen engagement in decision-making processes may be perceived as a democratic deficit of global governance.

The *World Wide Views on Climate Change and Energy* research team formed to encourage public deliberation and understanding around climate and energy issues. To encourage dialogue about these issues from local to global, they hosted two citizen engagement events during the year. The first was a panel organized to present results and discuss possibilities from the Global Day of Deliberation on climate change and energy, where CSU was one of four sites in the United States to host an event on behalf of the World Wide Views Alliance. The second event was an opportunity for Fort Collins residents to deliberate about the City of Fort Collins Climate Action Plan, with results provided to the City for consideration as they move forward with collecting feedback on its implementation. Finally, the team conducted a literature review on mini-publics, which are representative subgroups of a population brought together for the purpose of engagement and political deliberation.

Environmental Justice CSU environmentaljustice.colostate.edu

Exploring how and why equity and environmental justice are important elements of the study of the environment, public health, and sustainability at CSU.

Award: \$10,000

Principal Investigators:

Tara O'Connor Shelley, Department of Sociology
Melinda Laituri, Department of Ecosystem Science and Sustainability
Dimitris Stevis, Department of Political Science
Stephanie Malin, Department of Sociology

Research Areas: Climate Change and Energy; Food Security; Environmental Institutions and Governance; Sustainable Communities; Land and Water Resources; Biodiversity, Conservation and Management

Equity and environmental justice refers to the distribution of both environmental harms and benefits among people and between people and nature. Disciplinary interpretations of equity and environmental justice vary, producing important yet fragmented bodies of literature. In its second year of funding as a SoGES research team, *Environmental Justice CSU* raised the profile of equity and environmental justice and encouraged interdisciplinary research approaches at the University. During FY 2015-16 the team worked to build and sustain the environmental justice community of CSU scholars, document and refine the linkages between environmental justice and SoGES focal areas of sustainability

research, educate students about environmental justice issues, and begin strategizing long-term goals for the research team and scholarly community toward their ultimate goal to establish an environmental justice center at the University.

Key accomplishments:

- ▶ Membership increased to nearly 150 members, including 80 faculty, researchers, and students from 17 departments and all 8 colleges
- ▶ Hosted and co-hosted 15 events attended by approximately 500 people, including: 4 Environmental Justice Roundtables for experts to discuss research and philosophies, 3 Java and Justice events for researchers to present to students and colleagues, 5 lectures co-hosted with other academic units, and 2 events co-hosted with community organizations
- ▶ Transcribed and edited environmental justice briefs from the roundtable events hosted FY 2015-16 and the previous year
- ▶ Organized and delivered a one-day environmental justice workshop for the WCNR natural resources 544D class
- ▶ PI Stephanie Malin collaborated with faculty from University of Colorado, Boulder in the Colorado Power Dialog: an event for students to interact with state leaders as they develop a state-wide clean power plan

Social Sciences in Air Quality, Climate, and Health Research

Studying linkages between pollution and other aspects of air quality, climate change, and public health, with engagement from the social sciences to better understand human choices and behavior, improve communication of risks associated with poor air quality, and devise solutions to improve human health.

Award: \$7,000

Principal Investigators:

Marilee Long, Department of Journalism and Media Communication
Sonia Kreidenweis, Department of Atmospheric Science; Cooperative Institute for Research in the Atmosphere
John Volckens, Department of Mechanical Engineering; Center for Energy Development and Health
A.R. Ravishankara, Department of Chemistry
Jennifer Peel, Department of Environmental and Radiological Health Sciences

Research Areas: Climate Change and Energy

Poor air quality, and the resulting public health risks, stems almost entirely from the world's reliance on fossil fuel and biomass for energy and is tightly linked with climate change. While air pollution has been recognized as one of the leading causes of death and greatest risks to human health worldwide, governments, institutions, and individuals have been slow to acknowledge the need for change and to adopt effective change strategies. Communicating air quality risks,

accepting the need of change, and implementing solutions must occur on scales from the individual to the global. The *Social Sciences in Air Quality, Climate, and Health Research* team formed to connect these changes and their impacts to individuals and their lives by integrating the social science component to air quality research.

The team spent FY 2015-16 convening researchers from across campus to integrate social sciences into the existing work advancing scientific understanding of poor air quality and the role of changing climate in air quality issues. The team worked to integrate and promote an understanding of human behavior, governance and policy making, economic forces, and social systems in air quality research. They used funds to host a series of diverse networking and educational events to improve social science and air quality research connections and explore how social sciences can be effectively integrated. Over the year, participants gained a better understanding of the role that social science plays in addressing stakeholder needs in air quality, climate and health. The team successfully established new scientific relationships and collaborations across the University, many of which have begun new partnered work and exploration of additional funding opportunities.

EcoDistrict Urban Resiliency Metrics

Developing standardized measures and collecting baseline data to create a scientifically rigorous set of metrics for the EcoDistrict Framework, which will eventually be tested in the City of Fort Collins to help the City realize its climate neutrality, resource reduction, and healthy community goals.

Award: \$10,000

Principal Investigators:

Brian Dunbar, Institute for the Built Environment
Jane Choi, Department of Horticulture and Landscape Architecture
Jeni Cross, Department of Sociology

Research Areas: Climate Change and Energy; Food Security; Sustainable Communities; Land and Water Resources; Biodiversity, Conservation and Management

As Earth's population becomes increasingly urban, cities are facing complex economic, social, and environmental sustainability challenges that are best met through the collaborative effort of municipalities, private business, and applied researchers. Communities must identify tactics to establish and maintain healthy neighborhoods for future generations within the context of climate change and resource depletion. The global EcoDistricts Initiative is an effort to create and regenerate neighborhoods that are resilient, vibrant, resource efficient, and just. However, the current EcoDistrict Framework lacks scientific partnerships and metrics to assess each of its goals. The *EcoDistrict Urban Resiliency Metrics* research team was formed to create the metrics and collect baseline data for the comprehensive

EcoDistrict Framework, a critical first step in applying the framework locally in Fort Collins and informing subsequent research and development work for the global EcoDistricts effort.

The research team spent FY 2015-16 collecting existing data for the EcoDistrict Priority Areas and identifying gaps in environmental, economic, and social science for each. The team convened two interdisciplinary workshops with CSU faculty, researchers, students and City of Fort Collins staff to understand how to best measure progress in each EcoDistrict Priority Area, focused locally on the City of Fort Collins. Teams of subject experts were identified for each of six EcoDistrict Priority Areas, and analyzed current metrics and performed a gap analysis to recommend improved metrics. Additionally, the LAND630 class, Topics in Urban Design, analyzed the Fort Collins River District per the EcoDistrict Priority Areas, gathering applicable metrics to supplement the outcomes of the metrics workshops. The research team plans to integrate the new set of existing and missing metrics into the EcoDistricts protocol, and as a baseline for establishing an EcoDistrict in Fort Collins in the future. Additionally, the missing metrics will be used to outline potential research topics for developing a district-scale research agenda in the future.

Adaptation to Alternating Weather Extremes

Studying the ecological and social impacts of rapid "whiplash" among droughts, wildfires, and floods as a consequence of climate change and working to identify strategies to better prepare communities for sustainable adaptation to this increasing threat.

Award: \$10,000

Principal Investigators:

Craig Trumbo, Department of Journalism and Media Communication
Lori Peek, Department of Sociology
Melinda Laituri, Department of Ecosystem Science and Sustainability
Russ Schumacher, Department of Atmospheric Science

Research Areas: Sustainable Communities; Land and Water Resources

As a consequence of climate change, there is an increasing probability that areas may undergo a rapid "weather whiplash" between droughts, wildfires, and floods. When occurring together in a short period of time, these hazards pose extraordinary risk to agricultural systems and economies, both rural and urban infrastructures, and the natural ecosystems on which we depend. The *Adaptation to*

Alternating Weather Extremes research team used funds to analyze historical data, dating back to 1960, to locate in time and place extreme events in which these three hazards have exerted a combined effect in the United States and identify exemplar cases of weather whiplash over the last 50 years. During the year they transformed an original dataset of 87,000 drought, wildfire, and flooding incident reports into a time-series and began analyzing those events based on geographic proximity.

The research team aims to translate findings into actionable recommendations for improving community preparedness and resilience against the weather whiplash aspect of natural disasters. Further investigation will reveal ecological and social effects of weather whiplash and help identify strategies to better prepare communities for sustainable adaptation to this increasing threat. The final phase of this work, which will be conducted as a SoGES Resident Fellowship in FY 2016-17, will combine studies on ecological and social effects and examine historical records to investigate the social responses and consequences of these past events.

Resident Fellows

Faculty members engaged in creative sustainability research and problem solving. The program is designed to enhance scholarly contributions to sustainability by providing opportunities to accelerate progress and engage in the academic life of the School.

\$17.1K awarded to **3** fellows from **3** colleges

Colleen Duncan

Department of Microbiology, Immunology, and Pathology

Award: \$5,700

Research Areas: Environmental Institutions and Governance; Sustainable Communities; Biodiversity, Conservation and Management



Colleen Duncan is a veterinarian specializing in epidemiology and pathology and works in wildlife health research. Her work looks beyond the traditional approach of documenting and characterizing disease to the promotion of health, which is the result of interacting biological, social, and environmental factors.

Her research aims to better characterize health and the interconnectivity of humans, animals, and the environment, so it may be used as a powerful metric for conservation. Colleen spent FY 2015-16 developing concepts of health in wildlife conservation in collaboration with the Canadian Wildlife Health Cooperative and other scientific partners. During the year she wrote a report to the Centre of Foodborne, Environmental, and Zoonotic Infectious Diseases in Canada focused on early warning signals at the wildlife-environment-human nexus to inform public health decisions on climate change vulnerability and developed a multidisciplinary approach to defining wildlife health in national parks. She also used her Fellowship to design two new CSU courses: *GES 450 Health and Sustainability* and *PBHL 692 Healthy Parks Healthy People*.

María Fernández-Giménez

Department of Forest and Rangeland Stewardship

Award: \$5,700

Research Areas: Climate Change and Energy; Food Security; Environmental Institutions and Governance; Sustainable Communities; Land and Water Resources; Biodiversity, Conservation and Management



María Fernández-Giménez is a rangeland ecologist interested in ecological and social dimensions of wildland ecosystems. Her Fellowship investigated the art and craft of poetry and the practice of art-based research. During FY 2015-16 she created the *Land, People, Poetry Network*, which engaged diverse members of the CSU campus including faculty from multiple departments, graduate students, staff, and alumni, in a creative exploration of science, poetry, and sustainability. The network met regularly throughout the year, sponsored a visiting scholar, hosted a seminar and a public poetry reading, and held two writing workshops. Additionally, María published a manuscript containing a poetic analysis of herder interviews. As part of this process, she used Fellowship support to travel back to her study sites in Spain and read the poems, back-translated into Spanish, to the original interview participant, which added meaning, validity, and impact to the work. She also networked with Spanish colleagues working on similar themes and as a result is helping organize a workshop on art and ecology in Barcelona titled *Realising Potentials: Arts-Based Sustainability Science*.

Charles Davis

Department of Political Science

Award: \$5,700 **Research Areas:** Climate Change and Energy; Environmental Institutions and Governance



Charles Davis is a political scientist interested in energy and public lands policymaking. He spent FY 2015-16 conducting research on U.S. state and federal policies that regulate hydraulic fracturing for oil and gas and the extent to which federal regulators balance the need for energy development with environmental protection. He also investigated disaster management related to fracking, such as how states deal with the emergence of earthquakes linked to hydraulic fracturing operations and whether the state's reliance on oil and gas affected their likelihood to adopt earthquake mitigation policies. Charles developed two manuscripts related to this work: one on the Bureau of Land Management and how it balances fracking with its mandate for multiple use management, and the other on states with high oil and gas production and whether the adoption of policies aimed at reducing environmental risks of fracking was linked to the economic or political characteristics of the state.

Visiting Fellows

Local and international scholars hosted by the School to collaborate and connect with faculty experts at CSU while they work on their sustainability-related research.

Ademola Adenle Nigeria | Jan. 2016-Dec. 2016



Ademola Adenle is a former Research Fellow at the United Nations University, Japan. His current work focuses on sustainable development at the interface of natural and social sciences. As a Visiting Fellow with the School, he is working with interdisciplinary experts to co-edit a book on science, technology, and innovation for meeting sustainable development goals. He is also collaborating with faculty from the CSU's Department of Agricultural and Resource Economics on a multi-stakeholder analysis of climate change mitigation and clean energy in Africa. For this work, they are examining low-carbon development programs for renewable energy and barriers to implementation of these programs.

George Taylor United States | Sept. 2015-Aug. 2017



George Taylor is director of Philanthropy Support Services, a division of PaxTerra Inc. and chair of the advisory council of the Center for Asian Studies at University of Colorado, Boulder. As a Visiting Fellow George deepened his understanding of water resources in high mountain Asia with a particular focus on past, present, and potential future CSU contributions to water resources management in south, south-east and central Asia. He also explored internationalization at CSU with a view to recommending next steps to the University and applying lessons learned at University of Colorado, Boulder. George prepared a presentation for the Confucius Institute session at the AGU/CSU Hydrology Days 2016, gave a guest lecture in the Department of Languages, Literatures and Cultures course LFRE 492/692, and expanded his presentation on water resources in high mountain Asia.

“SoGES is a gem at the heart of CSU that nurtures important new initiatives, promotes cross-pollination and interdisciplinary thinking, and proactively injects global perspectives across the CSU campus and Fort Collins community.”



John Grant United States | Jan. 2015-Dec. 2016



John Grant is former Robert Kirby Professor of Strategic Management at the University of Pittsburgh. His current work focuses on interactions between organizational management and complexity of the natural world. As a Visiting Fellow, John has been giving presentations and networking with business schools and colleagues to increase the recognition and need for collaboration with environmental sciences.

Karen-Beth Scholthof United States

| Jan. 2016-Aug. 2016



Karen-Beth Scholthof is a professor in the Department of Plant Pathology and Microbiology and the faculty director of the Bioenvironmental Sciences undergraduate honors program at Texas A&M University. Karen spent her sabbatical as a Visiting Fellow with SoGES focused on her research on the history of tobacco mosaic virus with a particular focus on how Mendelian genetics was used to breed virus resistant pepper and tobacco plants. At CSU she shared her interests in the history of plant virology and the co-evolution of host-virus interactions that resulted in new ideas in the mid-20th century about the genetics of resistance for plant breeding. She participated on a SoGES Managing the Planet panel, interacted with School affiliates, and published a manuscript.

“SoGES is more than the sum of its parts: the School provides the structure to support and create opportunities for scholars to explore how deeply and broadly we can think about (and imagine) the complexity of life on Earth and how we can use this knowledge to ensure that such diversity is maintained and nurtured.”



Paul Hellmund United States | Mar. 2016-Feb. 2017



Paul Hellmund is an educator interested in understanding and incorporating sustainability into land-use decision making and the role of project- and place-based experiential learning for sustainability in higher education. He is the founder and president of Hellmund Associates and is the former president of the Conway School and director of its graduate program in sustainable landscape planning and design. As a Visiting Fellow, Paul aims to understand how innovative, experiential teaching approaches, most readily applied to small groups of learners, can be adapted to large universities and teaching sustainability. In FY 2015-16 Paul interviewed instructors and administrators to learn more about sustainability education at CSU and was invited to speak at the summer conference of CSU's Institute for Learning and Teaching. In the coming year, he will continue to collaborate with faculty at the University to further develop ideas for teaching sustainability.

Sustainability Leadership Fellows (SLF)

A cohort of 20 advanced PhD students and early career Postdoctoral Fellows – selected annually – interested in communicating their sustainability-related research. The School provides state-of-the-art training to effectively communicate science to the media and public, professional development skills and techniques, and strategies to build meaningful careers that incorporate engagement and interdisciplinarity.

5th cohort **20** fellows from **14** departments and **7** colleges

The year-long Sustainability Leadership Fellow program focuses on training and networking opportunities geared toward excellence in science communication and leadership. The program equips Fellows with tools and ideas for communicating science and provides training on professional skills applicable to their future careers. All 2015-16 Sustainability Leadership Fellows said they received significant benefit from the program. Most notably, they reported improved ability and confidence in communicating their research with diverse audiences, new leadership and professional skills, and the long-term value of an interdisciplinary network of peers gained as a result of the program.

.....

“The SLF program simultaneously enhanced my communication and leadership skills. Because the two go hand in hand, improvements in communication that resulted from the program’s training have also facilitated my ability to take on additional leadership roles and to be more effective in leading team efforts.”

.....

Training Curriculum:

- ▶ Two-day intensive Science Communication Workshop | Sept. 9-10, 2015
- ▶ Time Management and Writing Productivity | Sept. 29, 2015
Sarah Reed, Wildlife Conservation Society and Department of Fish, Wildlife, and Conservation Biology
- ▶ Storytelling | Nov. 11, 2015
John Calderazzo, Department of English and Changing Climates CSU
- ▶ Science and Policy | Dec. 8, 2015
Barry Noon, Department of Fish, Wildlife, and Conservation Biology and Doug Cloud, Department of English
- ▶ Communication drill: 2 Minutes to Describe Your Science to the CSU Provost | Dec. 8, 2015
- ▶ Interviewing and Job Negotiation | Feb. 23, 2016
Dan Bush, Office of the Provost and Executive Vice President and Department of Biology
- ▶ Working on Interdisciplinary Teams | Mar. 24, 2016
Kathleen Galvin, Department of Anthropology
- ▶ Seeking Support for your Research: Proposal Writing and the Funding Landscape | Apr. 26, 2016
Peter Backlund, School of Global Environmental Sustainability and Alan Knapp, Department of Biology

Additionally, Fellows each wrote a blog post and peer reviewed another’s work for publication on the School’s HumanNature blog.



SUSTAINABILITY HOUR RADIO SHOW

The 2015-16 cohort of Sustainability Leadership Fellows created and hosted *The Sustainability Hour*, a weekly KCSU radio show that began airing in spring 2016. The show serves as a platform to discuss global scale sustainability challenges, the impacts of human-induced changes on the natural world, and the current research addressing these important issues. Additionally, it provided an opportunity for Fellows to put their science communication training into practice. Over the course of the semester, Sustainability Leadership Fellow hosts interviewed more than 30 professors, graduate students, and visiting researchers working in a wide range of sustainability topics such as food security, biological diversity and conservation, climate change, and environmental governance.



2015-16 Sustainability Leadership Fellows

2015-16 cohort



Charlotte Aster
Ph.D. Candidate,
Department of
Biology; Graduate
Degree Program
in Ecology



Mike Angstadt
Ph.D. Candidate,
Department of
Political Science



Brittany Bloodhart
Postdoctoral Fellow,
Department of
Atmospheric
Science



Ana Bossa
Ph.D. Candidate,
Department of
Bioagricultural
Sciences and Pest
Management



Amber Childress-Runyon
Ph.D. Student, Department
of Ecosystem Science
and Sustainability;
Graduate Degree
Program in Ecology



Renee Curry
Ph.D. Student,
Department of
Atmospheric Science;
Graduate Degree
Program in Ecology



Ellen Daugherty
Ph.D. Candidate,
Department of
Chemistry



Adam Dillon
Ph.D. Candidate,
Department of Fish,
Wildlife, and Conservation
Biology; Graduate Degree
Program in Ecology



Ashley Evanoski-Cole
Ph.D. Candidate,
Department of
Atmospheric
Science



John Field
Postdoctoral Fellow,
Department of
Mechanical
Engineering



Tandra Fraser
Postdoctoral Fellow,
Department of
Biology; School of
Global Environmental
Sustainability



Shifra Goldenberg
Ph.D. Candidate,
Department of Fish,
Wildlife, and Conservation
Biology; Graduate Degree
Program in Ecology



Nathan Grubaugh
Ph.D. Candidate,
Department
of Microbiology,
Immunology,
and Pathology



Dylan Harrison-Atlas
Ph.D. Candidate,
Department of Fish,
Wildlife, and Conservation
Biology; Graduate Degree
Program in Ecology



Adrian Monroe
Postdoctoral Fellow,
Department of
Ecosystem Science
and Sustainability



Noelle Noyes
Postdoctoral Fellow,
Department of
Clinical Sciences



Aaron Piña
Ph.D. Candidate,
Department of
Atmospheric Science;
Graduate Degree
Program in Ecology



Patricia Salerno
Postdoctoral Fellow,
Department of
Biology



Amy Sheflin
Ph.D. Candidate,
Department of
Food Science
and Human
Nutrition



Zackary Wurtz bach
Ph.D. Candidate,
Department of
Forest and Rangeland
Stewardship

“ The SLF program is my favorite accomplishment of my graduate school experience at CSU. I plan to incorporate an aspect of sustainability in all of my research, my career, and my writing.”

“ ...this is a tremendously beneficial program 1) for the tangible skills it imparts, and 2) for the opportunity that it provides to step back from our disciplines and engage with other passionate, young researchers across the University.”

Global Biodiversity Center (GBC) biodiversity.colostate.edu

A network of faculty working on biodiversity research at the University to encourage knowledge transfer and cross-campus collaboration.

Executive Committee

Chris Funk (Director), Department of Biology
Joel Berger, Department of Fish, Wildlife, and Conservation Biology
Cynthia Brown, Department of Bioagricultural Sciences and Pest Management
Colleen Duncan, Department of Microbiology, Immunology, and Pathology
Kathleen Galvin, Department of Anthropology; School of Global Environmental Sustainability
Barry Noon, Department of Fish, Wildlife, and Conservation Biology
Arathi Seshadri, Department of Soil and Crop Sciences
Kate Shoenecker, Department of Ecosystem Science and Sustainability
Diana Wall, Department of Biology; School of Global Environmental Sustainability
George Wittemyer, Department of Fish, Wildlife, and Conservation Biology

The mission of the new Global Biodiversity Center is to advance understanding, conservation, and appreciation of life's variation, ranging from genetics and organisms to ecosystems and their interactions. In all systems, aquatic to terrestrial and managed to natural, biodiversity maintains life on our planet and underpins the ecosystem services vital to human well-being, including food, carbon storage, climate regulation, and aesthetics and cultural support. The Global Biodiversity Center works to maintain and enhance biodiversity through research, policy advancement, education, and outreach at the University. Originally the SoGES Biodiversity Working Group, in 2015 the Global Biodiversity Center became an officially designated Center of the University. In FY 2015-16 the Center worked to formalize its leadership, increase online presence, and engage with the Fort Collins and academic communities.

In FY 2015-16 the Global Biodiversity Center:

- ▶ Created an interactive online map that features the breadth and global distribution of biodiversity research being conducted at CSU; currently 52 projects and 17 faculty researchers featured
- ▶ Hosted 2 large events: a pollinator workshop and fast-paced ignite-style talks
- ▶ Overhauled its website to improve the user interface and more closely resemble the SoGES family of websites and created a Twitter account and a Facebook page to increase online engagement

The Africa Center

africacenter.colostate.edu

A community of faculty, students, community members, and African partners addressing issues of African biodiversity, conservation, health, and livelihoods.

Leadership

Kathleen Galvin (Director), Department of Anthropology; School of Global Environmental Sustainability
Jessica Davis, Department of Soil and Crop Sciences
Paul Evangelista, Department of Ecosystem Science and Sustainability; Natural Resource Ecology Laboratory
Stacy Lynn, Department of Ecosystem Science and Sustainability; Center for Disaster and Risk Analysis; Natural Resource Ecology Laboratory
Robin Reid, Department of Ecosystem Science and Sustainability; Center for Collaborative Conservation
Sue VandeWoude, Department of Microbiology, Immunology, and Pathology

The mission of the Africa Center is to enhance biodiversity, advance human and animal health, empower communities, and promote environmental, economic, and social sustainability in Africa. The Center invests in innovative and interdisciplinary research that crosses conventional disciplines in an attempt to tackle environmental and sustainability issues on the continent. Members are actively involved in research, education, and collaborative engagement between institutions in Africa and the United States to promote sustainable ecosystems and societies.

In FY 2015-16, the Africa Center experienced a year of growth in community engagement, international interest, and student, faculty, and staff participation. The Center established new connections with African nongovernmental organizations in Colorado, including Thinking Humanity and the Murulle Foundation, and launched a partnership with United Way of Weld County to develop a project focused on African refugees living in Northern Colorado. A key accomplishment was the creation of an Africa projects and partnerships online map, which acts as a geographic networking tool to connect University researchers and students to practitioners and policymakers. The map currently features 34 research projects, representing about one third of CSU research on the African continent.

In FY 2015-16 the Africa Center:

- ▶ Hosted Calestous Juma and 3 other acclaimed guest speakers, 4 coffee socials, and an Africa & Ale networking event with a specially brewed southern Africa style beer
- ▶ Hosted the Africa Center Faculty Seminar Series, for faculty to share their research and connect with the CSU and Fort Collins communities
- ▶ Email list reached 415 recipients, an 80% increase and encouraged engagement with new Twitter and Instagram accounts, and 155 Facebook Likes, a 36% increase

Future Earth futureearth.org

The global research platform providing the knowledge and support to accelerate our transformations to a sustainable world.

Colorado Global Hub - Secretariat Staff

Josh Tewksbury, Director of the Colorado Global Hub
Jon Padgham, Capacity Building Lead
Craig Starger, Research Liaison Officer
Daniel Strain, Digital and Social Media Communications Lead

Future Earth is a 10-year international initiative to coordinate new, interdisciplinary actionable science efforts and solutions to sustainability research and global environmental change. In 2015 Future Earth became operational around the world with the appointment of an Executive Director and staff in five Global Hubs based in Colorado, Montreal, Paris, Stockholm, and Tokyo. The Colorado Hub resides within the School of Global Environmental Sustainability at CSU and the Sustainability, Energy and Environment Complex at CU-Boulder, supported by a grant from the U.S. National Science Foundation. The CSU Future Earth site began fully functioning in FY 2015-16 with the appointment of the Colorado Global Hub Director Josh Tewksbury and support staff based at the University.

Future Earth officially transitioned a number of Core Research Projects from the International Geosphere-Biosphere Programme and Diversitas as those programs formally ended in 2016. Future Earth Global now manages over 20 large research programs focused on global environmental change and sustainability science. The Colorado Hub is directly responsible for managing three of these projects related to evolutionary biodiversity, global health, and ecosystem services. In addition, in 2015-16, the Colorado Hub managed the establishment of two new Knowledge Action Networks for Future Earth – one focused on connecting human and environmental health, the other focusing on ocean sustainability.

In FY 2015-16 the Future Earth Colorado Hub was also instrumental in the designation of two new Future Earth consortium offices in Africa established in 2016, one based in Rwanda, the other in South Africa. These offices will serve as conduits for communication between African science communities and the global Future Earth community. Finally, the Colorado Hub has developed a partnership with the Belmont Forum to draw on the expertise of the Future Earth scientific community to inform Belmont's annual Collaborative Research Action (CRA) funding opportunities. The first two co-branded "Belmont-Future Earth CRAs" will focus on oceans and the food energy water nexus.

Conservation Development cd.colostate.edu

Balancing development with conservation in urbanizing landscapes by evaluating the ecological, economic, and social sustainability of alternative forms of development patterns in the places where people live and work. Conservation Development is a SoGES Working Group.

Principal Investigators

Liba Pejchar, Department of Fish, Wildlife, and Conservation Biology
Sarah Reed, Wildlife Conservation Society; Department of Fish, Wildlife, and Conservation Biology

The Conservation Development Working Group is comprised of 38 scholars and practitioners from five colleges and 10 departments at CSU, plus 12 external institutions. They define conservation development as an approach to the design, construction, and stewardship of a development that achieves functional protection of natural resources, while also providing social and economic benefits to human communities. Their work focuses on creating a low cost, high impact research and outreach program of both scientific importance and practical relevance for land conservation and sustainable development and the group serves as a regional and national resource for information and expertise in this rapidly evolving field.

Originally a SoGES Global Challenges Research Team, Conservation Development was established as a working group with the School in 2015. The group's primary activities in FY 2015-16 focused on continued collaboration with the City of Fort Collins Nature in the City initiative, and included developing wildlife connectivity models to inform land protection and management. The group also began implementing a second year of its citizen biodiversity project, a volunteer citizen science program for monitoring birds and butterflies on public and private open space in Fort Collins. Data from the biodiversity monitoring surveys were used by the City to implement the Nature in the City Strategic Plan, which includes design guidelines, policies, and actions to ensure that high-quality natural areas are preserved in a rapidly growing urban environment. Additionally, pre- and post-program surveys found that volunteers improved their knowledge of bird and butterfly ecology, became more familiar with Fort Collins open space and connected to nature, and reported increased interest in being involved with the Nature in the City initiative. During the year, the Conservation Development working group prepared manuscripts from prior research projects, submitted several grant proposals, published one report, had one journal article in press, and gave six scientific presentations.

Global Soil Biodiversity Initiative (GSBI) globalsoilbiodiversity.org

A collaboration of international scientists dedicated to enhancing the use of soil biodiversity science and ecosystem services in policy and management of global terrestrial ecosystems. The Global Soil Biodiversity Initiative secretariat is housed at SoGES.

The Global Soil Biodiversity Initiative encourages state of the art research from scientists internationally, while concurrently making that science relevant to the public, land managers, and policy makers. Scientific priorities include identifying key knowledge gaps linking soil biodiversity and ecosystem function, developing a platform for synthesis of soil biodiversity data, methods harmonization, and establishing a forum for global research networks. In FY 2015-16 the Global Soil Biodiversity Initiative made major contributions to advancing soil ecology knowledge and bringing it to global policy makers through publication of the Global Soil Biodiversity Atlas, a Status of the World's Soil Resources report, and other peer-reviewed publications.

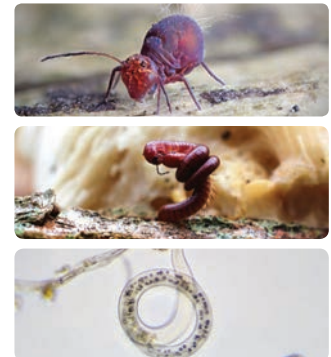
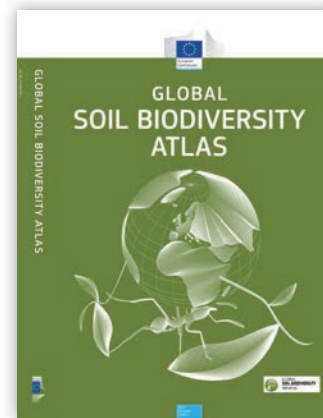
Key accomplishments:

- ▶ Contributed to the Status of the World's Soil Resources, published by the Food and Agriculture Organization of the United Nations and prepared by the Intergovernmental Technical Panel on Soils
- ▶ Provided review for the European Food Safety Authority Scientific Opinion on risk assessment of plant protection products for in-soil organisms
- ▶ Organized a session at the Ecological Society of America Centennial Meeting, Weaving the Soil Biodiversity Food Web: Advancements in Understanding on a Global Scale
- ▶ Contributed to the Protist 2016 meeting in Moscow, Russia
- ▶ Translated the Hidden Life of Soil card game into Portuguese
- ▶ GSBI working groups published 3 peer reviewed manuscripts
- ▶ Members received ~\$36,000 in funding support

In FY 2015-16 the GSBI:

- ▶ Membership grew to 907 scientists representing 95 countries, a 29% increase
- ▶ Facebook Likes grew to 2,351, a 106% increase
- ▶ Twitter followers grew to 2,644, a 76% increase
- ▶ Website saw 11,423 visitors from 167 countries
- ▶ *Beneath our Feet* blog saw 2,664 visits from 107 countries, a 42% increase
- ▶ Newsletter grew to 3,202 recipients, a 15% increase

Global Soil Biodiversity Atlas



The GSBI and European Commission Joint Research Centre formally unveiled the Global Soil Biodiversity Atlas at the United Nations Environment Assembly in Nairobi, Kenya, on May 25, 2016. The 175-page Atlas is a collection of scientific facts, figures, and images highlighting the role soil biodiversity plays in ecosystem services including nutrient cycling, food and fiber production, and greenhouse gas emissions. It is intended as a resource for policy makers, researchers, and soil enthusiasts alike. It is the first Atlas ever created for global soils, and was created with contributions of more than 120 scientists from 29 countries.

Published in print and online, the digital version of the Atlas has been viewed more than 3.7 million times and more than 24,000 copies have been downloaded as of June 30, 2016. It has been shared more than 8,000 times on Facebook and had over 125 million views on social media.

In praise of the Atlas:

“ [the Atlas will] contribute to raising awareness about the importance of soil biodiversity for the functioning of our ecosystems, our ecosystem services and ultimately human well-being.”

–Anne Larigauderie, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

“ ... a major contribution to the [European Union] target of halting the loss of biodiversity and ecosystem services in the EU by 2020, and ... the 2030 Agenda for Sustainable Development on sustainable food production and fighting land degradation.”

–Karmenu Vella, Commission for the Environment, Maritime Affairs and Fisheries, European Commission and Tibor Navracsics, Commission for Education, Culture, Youth and Sport, European Commission

EDUCATION

The School is actively involved in educating and equipping students with knowledge and tools to tackle sustainability challenges by offering interdisciplinary sustainability curricula, promoting the development and integration of sustainability concepts into courses across campus, and working to increase the breadth of programs for all levels of students.



In FY 2015-16 the School converted two experimental courses to permanent courses, created a new course to be taught in Spring 2017, received approval for four graduate certificates, and created the new Interdisciplinary Minor in the Role of Sustainability in Peace and Reconciliation Studies.

Global Environmental Sustainability Minor (GES)

Providing students with core knowledge to address real world sustainability challenges, preparing students today to make a difference tomorrow. The minor is a 21-credit sequence with course offerings from 25 different subject codes across all eight colleges, providing depth in learning and allowing students to tailor coursework to augment their interests.

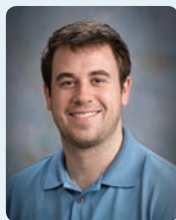
67 graduates **259** students enrolled from **46** different majors

Students enrolled in the GES minor come from all eight colleges and 46 different majors. Graduates have positions with companies that include City of Fort Collins Parks Department, Boy Scouts of America, Kind Designs, Vail Resorts, Videojet, and Colorado Outward Bound School.



2016 GES minor graduates and SoGES leadership

From an alumn



“ My senior year of high school I was trying to decide where I would be attending college. I came to Fort Collins that day sure that I would be attending Colorado College, but because of the School of Global Environmental Sustainability I left a CSU Ram. The School of Global Environmental Sustainability is the reason I chose to attend Colorado State University, and it was likely the best and most influential decision I have ever made.”

- **Michael Streight**, GES minor graduate

GES Courses

GES 101: Foundations of Global Environmental Sustainability *Offered online & classroom style*

GES 101 provides a comprehensive survey of issues in global sustainability and lays the groundwork for a firm understanding of sustainability grand challenges. Open to all students at CSU, the introductory course in the GES minor also exposes students to curricular opportunities across all eight colleges.

GES 101

183 students enrolled in fall 2015
123 students enrolled in spring 2016
To date, 1,979 CSU students
have completed GES 101

GES 180-A1: Sustainable Energy

GES 180-A1 was approved in FY 2015-16 to become a permanent course, GES141, starting in the fall of 2016. The course introduces students to the basics of energy production and evaluates the sustainability of different sources of energy, including renewable energy. Students explore energy storage, transmission, pollution, and conversion and are introduced to life-cycle analysis, policies, regulations, and economics of energy production.

GES 180-A2: Introduction to Sustainability Engagement

The GES 180-A2 one-credit course was created to support the EcoLeaders Program run by CSU's Housing and Dining Services. The course teaches students, selected as EcoLeaders for their dormitories, about campus sustainability efforts and how local actions are connected to global issues in sustainability.



“The GES minor will allow me to solve environmental issues in the supply chain profession. A GES minor from one of the top sustainability schools in the world seemed like a no brainer.”

- Alex Wheeler

GES 380-A1: Sustainability in Practice/ GES 381 Practicum

The variable credit GES 380-A1 course focuses on implementing sustainability projects on campus. GES and EcoLeader students propose and implement projects to educate other students and increase the operational sustainability of campus life.

GES 441: Analysis of Sustainable Energy Solutions

GES 441 was approved in Spring 2016 and will be taught starting in 2017. The course will focus on energy as a critical resource for society and its connection to climate change, food production, and water resources. GES 441 will be the capstone for a soon-to-be-proposed minor in sustainable energy, and can also be taken by interested students outside the minor.

GES 450: Global Sustainability and Health

GES 450 was approved in Spring 2016 and will be taught starting in Spring 2017. The course is designed to introduce students to important aspects of health as they are influenced by environmental change and brings together physical and social sciences to highlight mechanisms of change.

GES 470: Applications of Environmental Sustainability

GES 470 concentrates on practices and problem solving for environmental sustainability and emphasizes assessment tools, decision-making, and best practices. The GES minor capstone course accepts a limited class size for more focused coursework and interdisciplinary student teams. Starting Fall 2015 GES 470 is now offered both semesters to accommodate the growing number of students enrolled in the minor.

GES 470

67 students enrolled in FY 2015-16
To date, 277 students have
completed GES 470

GES 480: Sustainability and the Law

GES 480 is an experimental course that was taught for the first time in Fall 2015. The course approaches sustainability through the lens of case law, considering the role of law from the local to the international level. Students explore the differences between how scientists address sustainability and how lawyers approach the issues.

GES 520: Issues in Global Environmental Sustainability

GES 520 is a dynamic course that provides students with a deep understanding of sustainability issues, placed in broader economic and social context. The course is open to all graduate students across campus.

Course Endorsement

The School endorses courses with strong sustainability content. There are 57 GES-endorsed courses across seven colleges. Endorsement is noted in the course catalog and on student transcripts, attracting additional students to these courses and allowing employers and graduate programs better insight into the value of courses taken.

Sustainable Water Interdisciplinary Minor (SWIM)

SWIM was created in 2015 by the CSU Water Center and is academically housed in the School, a collaboration that increases efficiency with academic coordination handled by the SoGES Curriculum Committee and content-relevant advising by Water Center staff. Minor students learn about water issues from social, political, economic, and ecological perspectives, and gain holistic knowledge of the complexities of water management and use. Currently there are 16 students enrolled in the minor and eight have graduated with the minor.



2016 SWIM graduates and CSU Water Center leadership

Interdisciplinary Minor in the Role of Sustainability in Peace and Reconciliation Studies (SPRS)

The SPRS minor was approved in Spring 2016 and will be actively enrolling students starting January 2017. Originally housed in International Programs, the minor migrated to be housed at SoGES in FY 2015-16. The SPRS minor was modified through changes in courses to encompass the social, philosophical, and educational aspects of peace and reconciliation and how these can address issues of sustainability.

Graduate Certificates

The University has created a new category of educational studies known as Graduate Certificates. These programs consist of 9-15 credit sequences that are narrowly focused on a particular topic. Students can receive the certificate as part of a Masters or Ph.D. program or as a stand-alone program. SoGES received authorization for four certificates in FY 2015-16, all of which will begin to accept students in January 2017. These certificates were created in conjunction with the University's Office of Defense Engagement.

Certificates:

- ▶ Graduate Certificate in Applied Global Stability: Agriculture
- ▶ Graduate Certificate in Applied Global Stability: Natural Resources
- ▶ Graduate Certificate in Applied Global Stability: Water Resources
- ▶ Sustainable Peace and Reconciliation Studies Graduate Interdisciplinary Studies Program

ENGAGEMENT

The School promotes dialogue about Sustainability with the local and global communities through an extensive number and diversity of events, ongoing discussion with a wide variety of stakeholders, and an active and dynamic online presence.



Dining with Sustainability

A monthly dinner series convening researchers and managers across Northern Colorado working in areas of environmental sustainability.

Made possible by the generosity of the Bohemian Foundation



Dining with Sustainability dinner

Dining with Sustainability dinners provide sustainability experts from the University, federal and local agencies, and the non-profit and private sectors an opportunity to:

1. Establish and strengthen networks
2. Identify opportunities for collaboration and information-sharing
3. Promote creative and innovate approaches to one's work
4. Inspire research, enterprise, and collegiality

Each dinner is loosely structured to promote exchange of ideas and generate conversation through both small and large group formats over the course of the evening. The School circulates participant lists and food for thought in advance of each dinner and houses a full list of active participants on its website. The program covers dinner and refreshments, the event is casual and fun, and participants regularly stay well beyond the 2.5 hour timeframe to continue discussions.



“I think the member composition for the dinner was very well planned. It was cohesive, yet different. The networking dinner provided numerous opportunities for collaborating between academia and outside entities (e.g. City of Fort Collins), and inform other researchers about individual research and explore avenues for collaborative interdisciplinary research. I am confident that I will be able to work on new projects as a result of the dinner series from SoGES.”

Six dinners were hosted in FY 2015-16. The School accepts approximately 20 participants for each event, selected to assure disciplinary and organizational diversity and encourage active interaction. These participants came from:

- ▶ Colorado State University (26 departments and units across 7 colleges)
- ▶ local and federal agencies (U.S. Forest Service, U.S. Geological Survey, National Parks Service, City of Fort Collins)
- ▶ non-profit, non-governmental, and private organizations (Trees Water and People, The Nature Conservancy, Platte River Power Authority, Conservation Science Partners, Alliance for Sustainable Colorado, Rocky Mountain Innosphere, CARE International, Sylvan Dale Ranch, and several small businesses)

Participant surveys consistently reported new connections established, stimulating conversations, new perspectives gained, new ideas and renewed inspiration for one's work, and overall enthusiastic reviews of the program and opportunity to engage with a community of experts working in sustainability science.



“...the conversation was deep, inspiring, and I believe there will be meaningful follow-up interactions.”

Student Sustainability Center

A University-wide, student run organization dedicated to empowering students to engage in sustainability activities and innovation. The Center involves students in volunteer projects, hosts events to raise awareness about sustainability, consolidates and distributes sustainability-related information and news, and builds relationships across campus to promote environmental initiatives. The Student Sustainability Center is housed at SoGES.

4 officers **1,129** email subscribers **9** events & booths



The Student Sustainability Center worked to continue and grow its presence on campus and expand and improve partnerships with external organizations in FY 2015-16. The Center made significant improvements to existing projects to have greater impact, particularly the sustainability signage and nitrogen footprint projects. Membership increased as well as student involvement in projects and events, and the Center was able to facilitate many connections for students to obtain sustainability-related internships and volunteer opportunities.

In FY 2015-2016 the Center had:

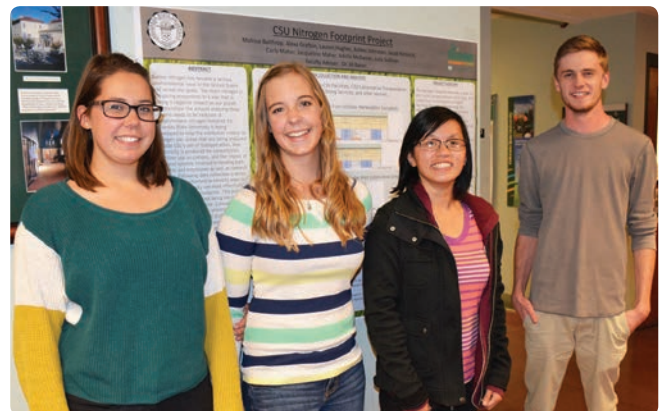
- ▶ 4 paid officers: director, associate director of engagement, associate director of outreach, secretary
- ▶ 16 attendees on average at bi-weekly meetings
- ▶ 1,129 email subscribers, a 20% increase
- ▶ 674 Facebook Likes, a 10% increase

Projects:

- ▶ **Nitrogen Footprint Project:** the Student Sustainability Center completed the final nitrogen footprint calculation for the CSU campus in Jan. 2016. The Center discovered that the largest source of nitrogen output at the University in 2014 came from food procurement, followed by utilities and electricity use. The Center held meetings with CSU leadership to make recommendations on implementing nitrogen reduction efforts. This project is part of the Nitrogen Footprint Network, funded by the U.S. Environmental Protection Agency.
- ▶ **Sustainability Signage Project:** the Center placed new signs throughout campus to remind people to limit paper towel usage, turn off lights, and bring a water bottle to campus.
- ▶ **Leave the Plastic, Plant a Tree:** the Center continued the campaign to reduce the use of single-use plastic bags in CSU's Lory Student Center bookstore in association with the Associated Students of CSU Plastic Ban Resolution.
- ▶ **Associated Students of CSU Endorsements:** the Center was a primary endorser of two resolutions passed by ASCSU - the Fair Trade University Resolution and the Building Efficiency Resolution.



Student Sustainability Center booth at CSU's Earth Day Festival



Student Sustainability Center Nitrogen Footprint Project team members

Website

sustainability.colostate.edu

In FY 2015-16 the School website experienced:

- ▶ 55,399 visits, a 6.4% increase
- ▶ visits from 187 countries
- ▶ international traffic constituted 23% of total visits

The website houses 174 archived event and educational videos, which received 1,186 views during the year.

Blog

blog.sustainability.colostate.edu

In FY 2015-16 the HumanNature blog had:

- ▶ 20 guest posts from CSU early career postdoctoral fellows and Ph.D. students
- ▶ 5,760 visits, a 31.8% increase
- ▶ international traffic constituted 50% of total visits

Social Media and Correspondence

In FY 2015-16 the School had:

- ▶ 3,056 subscribers to the School email list and newsletter, a 10% increase
- ▶ 1,300 Facebook Likes, a 9.5% increase
- ▶ 1,823 Twitter followers, a 21% increase

Media Mentions

In FY 2015-16 the School had:

- ▶ 113 mentions in the media
- ▶ 25 stories and mentions in CSU SOURCE
- ▶ 4 mentions in the *Coloradoan*

Events

In FY 2015-16, School conference rooms were used 239 times for sustainability-related meetings and events, totaling 458 usage hours, for groups from across campus and the community. The School provided audio-visual support for 140 of these meetings. Additionally, School conference rooms were used 110 times for School-initiated meetings and events, totaling an additional 136 usage hours.



Public events held showed an increase of 35% from the previous year. These included 15 panels, 9 receptions, 25 guest lectures, 8 workshops, 5 showcases, 6 film screenings, and 2 conferences and ceremonies.



25 attendees



156 attendees

175 attendees for five sessions



ENGAGEMENT

The film is here!

MERCHANTS OF DOUBT

A FILM BY ROBERT KENNER

Inspired by the acclaimed book by Naomi Oreskes and Erik Conway, MERCHANTS OF DOUBT shows audiences a secretive group of silver-tongued pundits-for-hire who push themselves in the media as scientific authorities on tobacco and climate change

Wednesday :: 2015
SEPT 30
6pm-8pm free public event
no tickets required

SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
Colorado State University
Lory Student Center Theater

sustainability.colostate.edu/events/merchants-of-doubt

400
attendees

UNDERSTANDING THE EPA'S

CLEAN POWER PLAN

By 2030, the Clean Power Plan will reduce carbon emissions from power plants by 32%, or ~870 million short tons, below 2005 levels. That equals the annual emissions from: 166 million cars or 70% of our country's passenger vehicles. (Source: USEPA)

This workshop explores the technical, environmental and political implications of this landmark regulation.

BILL RITTER
Former Colorado Governor and currently the Director of the Center for New Energy Economy

WEDNESDAY :: 2015
September 30
1:30-3:30pm Lory Student Center Theater
Free and open to the public. Registration required.

CO-HOSTED BY:
NEW ENERGY ECONOMY | ENERGY INSTITUTE | SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY

For more information and to register, CLICK HERE!

150
attendees

115
attendees
15
coffee social attendees

INTERDISCIPLINARY SCIENCE & PLANETARY HEALTH in the

ANTHROPOCENE

AN ECOLOGICAL PERSPECTIVE

Josh Tewksbury
DIRECTOR, Colorado Global Hub, FutureEarth
RESEARCH PROFESSOR, University of Colorado, Boulder
SENIOR SCHOLAR, School of Global Environmental Sustainability, Colorado State University

TUESDAY
OCT 6, 2015
1-2pm - Lecture
2-2:30pm - Open Forum
LORY STUDENT CENTER ROOM 3B2

SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
Colorado State University
futureearth

For more information, visit: sustainability.colostate.edu/events/josh-tewksbury-lecture

CSU's Public Lands History Center presents the Fall 2015 American West Program

100 YEARS OF ROCKY MOUNTAIN NATIONAL PARK

Conversations on Park History & Interpretation

Fall River Road, West side of Rocky Mountain National Park

THOMAS ANDREWS
Assistant Professor of History, University of Colorado Boulder

RICH FEDORCHAK
Chief of Interpretation, Education, Public Programs, Rocky Mountain National Park

MARK FIDGE
Senior, Colorado State University

THURSDAY
NOV 5, 2015
4:15-6:30pm
Morgan Library Event Hall
(located on the first floor)

Co-hosted by: CSU's Department of History

SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
Colorado State University

sustainability.colostate.edu/events/american-west-program

215
attendees

City of Fort Collins

CLIMATE ACTION 2020

2020 *is* You

OPEN HOUSE

Provide feedback on the City's Climate Action Plan initiatives & 2020 goals

with keynote speakers:

Diana H. Wall
School of Global Environmental Sustainability, CSU
Climate change: From Antarctica to Colorado

Brian Dunbar
Institute for the Built Environment, CSU
Sustainable cities: Bringing the best practices to our town

MONDAY
DEC 14, 2015
5:30-7:30pm, remarks at 6pm
Galvanize, 242 Linden Street

Refreshments provided
Free and open to the public

Visit fortgov.com/climateaction for information on the Climate Action Plan

175
attendees

100
attendees

Colorado State University

CONVERGE 2016

Collaborate. Learn. Network.

An open forum to learn what CSU Sustainability Centers do & how YOU can get involved!

The following CSU Center for Disaster and Risk Analysis Center for Managing Wildland-Urban Interface Fire Risk

Colorado Forest Restoration Institute
Colorado Natural Heritage Program
Colorado State Forest Service at CSU

CSU Facilities
CSU Water Center
Ecosystem Science and Sustainability Student Club
Earth System Modeling and Data Integration
Future Earth
Global Bio Diversity Center
Natural Resource Ecology Laboratory
President's Sustainability Committee
Semi-arid Grasslands Research Center
Wildland Science, Fire Science Institute
Student Sustainability Center

Wednesday
FEB 17
5PM-6:30PM
AVOGADRO'S NUMBER
605 S. MASON STREET

SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
Colorado State University

Facebook.com/soc.csu @soc.csu #converge2016 SUSTAINABILITY.COLOSTATE.EDU

RURAL Reinvented

EXPLORING SHIFTS IN RURAL AMERICA

Panelists will examine the myths and realities of changes in rural America from demographic, natural resource, agricultural, and economic perspectives.

SUSAN MOORE
Lyle Lyle Dairy

CHRIS GOEMANS
Professor of Agricultural & Environmental Economics, Colorado State University

LOU SWANSON
Chief of Engagement, Colorado State University

DAVID BROWN
Department of Agricultural Economics, Colorado State University

STEPHAN WELER
Department of Economics, Colorado State University

FRIDAY
FEB 19, 2016
2:30PM-4PM
AVOGADRO'S NUMBER
605 S. MASON

Sponsored by the Department of Sociology and Department of Agricultural & Resource Economics

SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
Colorado State University

sustainability.colostate.edu/events/rural-reinvented

80
attendees

CSU's Public Lands History Center presents the Spring 2016 American West Program

THE POLAR REGIONS

AN ENVIRONMENTAL HISTORY

ADRIAN HOWKINS
Associate Professor of Global Environmental History, Colorado State University

THURSDAY
MARCH 3, 2016
4:30-6pm
Morgan Library Event Hall
(located on the first floor)

Co-hosted by: CSU's Department of History

SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
Colorado State University

sustainability.colostate.edu/events/the-polar-regions

75
attendees

95
attendees

Reception honoring author **ED WARNER**

THURSDAY :: 2016
MARCH 31
AVOGADRO'S NUMBER
605 S. MASON ST.
4:00PM to 6:00PM
Author remarks begins at 4:30pm.

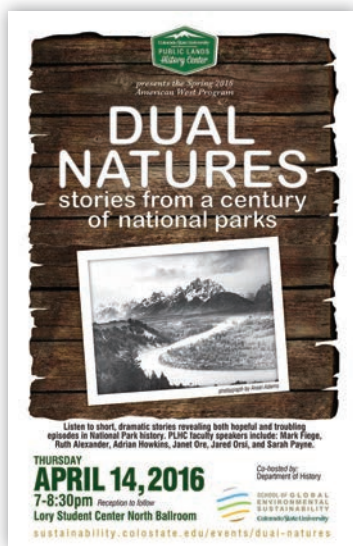
Copies of the book will be available for purchase.

WYOMING COLLEGE OF Natural Resources
Colorado State University

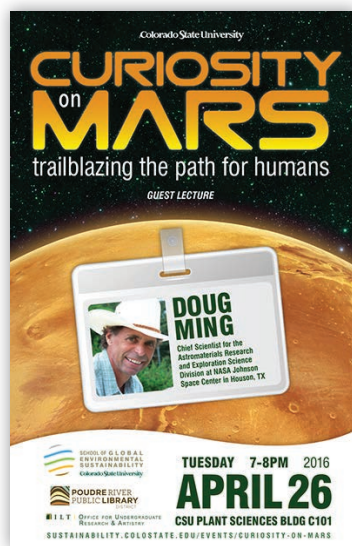
Running with Rhinos
with Rhinos
ED WARNER

ED WARNER is past president and owner of Expedition 20 Company and is known for his extraordinary research and adventures work. He spent 20 years as an exploratory geologist, and worked for the USGS. He has authored or co-authored several books, including Running with Rhinos, which is a true story of his adventures in the wild. He has also written a novel, The Last Days of the World, which is a dystopian novel about the end of the world.

sustainability.colostate.edu/events/running-with-rhinos Free public event

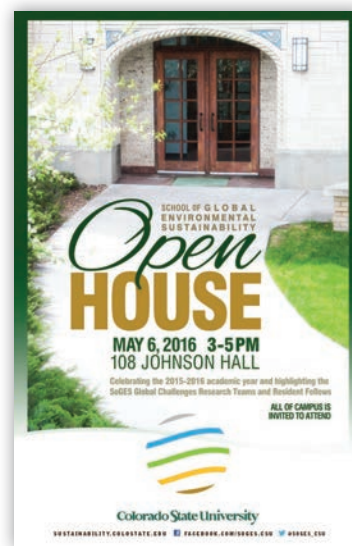


150
attendees

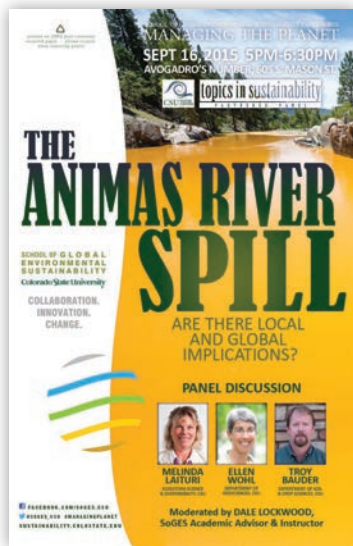


170
attendees

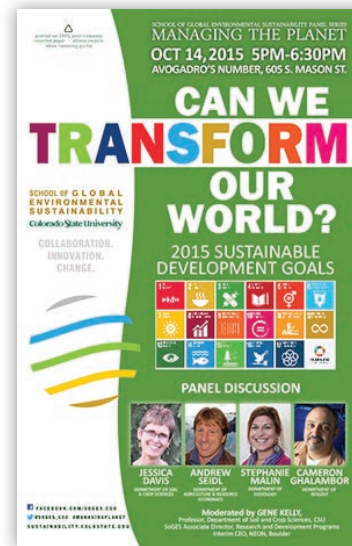
60
attendees



Managing the Planet Panel Series Addressing the most current sustainability issues with diverse panels of CSU experts and designed for engagement with the local community.

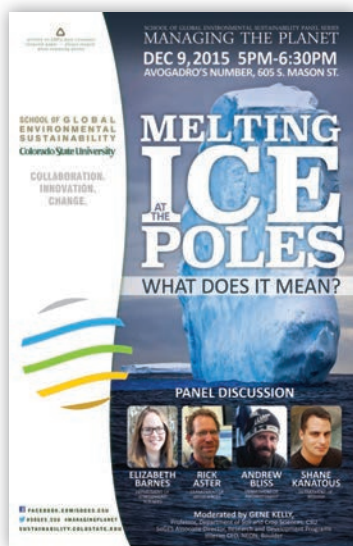
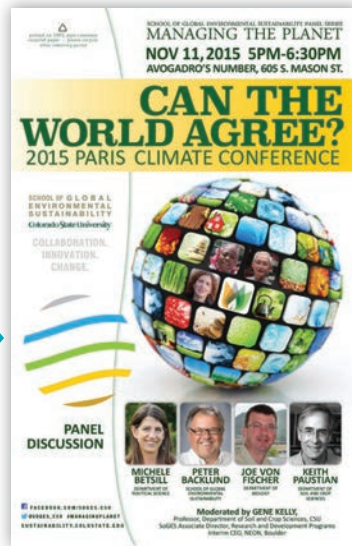


160
attendees

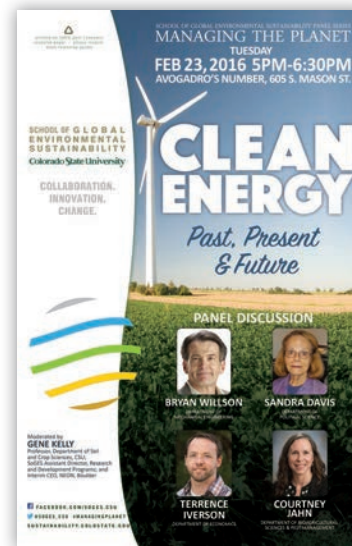


120
attendees

130
attendees

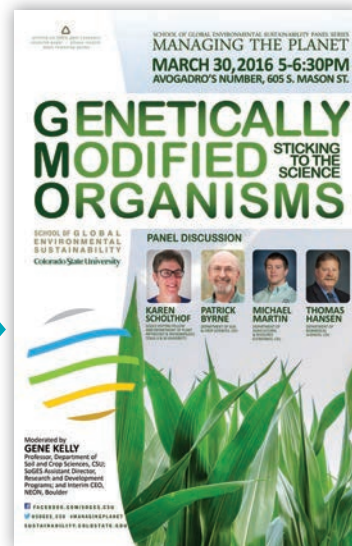


100
attendees



115
attendees

120
attendees



ENGAGEMENT



120
attendees



Panelists at the Nov. 11, 2016 Managing the Planet discussion

Antarctic Lecture Series *Discussing life and work 'on the ice' with invited Antarctic researchers.*

THE SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
ANTARCTIC LECTURE SERIES PRESENTS...

LAVA LAKES, CALVING ICE AND HUNGRY SEALS

USING TERRESTRIAL 3D LASER SCANNING (LIDAR) FOR ANTARCTIC SCIENCE

MARIANNE OKAL UNAVCO BOULDER, CO

Terrestrial Laser Scanners (TLS) collect stunning 3D, spatial data sets of just about anything they can be pointed at, making them a perfect tool for scientists studying everything from landforms to even marine biology. UNAVCO, Inc., an NSF-sponsored non-profit based in Boulder, CO, provides TLS instruments and field engineering support to several projects in Antarctica every year as part of its greater geodetic support mission. Come learn how this versatile technology is being used by our field engineers to help geologists, volcanologists, biologists and historians in Antarctica further their studies!

SEPT 23rd
7:00 - 8:00 PM
FORT COLLINS LIBRARY
201 PETERSON ST.

50
attendees

THE SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
ANTARCTIC LECTURE SERIES PRESENTS...

Remember the OZONE HOLE?

TERRY DESHLER Atmospheric Science University of Wyoming

Where does the ozone hole occur? Why there? What causes it? Is it still occurring? For how much longer? How is it related to CFCs? What happened to CFCs? Come and test your knowledge at an interactive lecture led by Terry Deshler, Professor Emeritus, University of Wyoming.

OCT 21st
7:00 - 8:00 PM
FORT COLLINS LIBRARY
201 PETERSON ST.

40
attendees

40
attendees

THE SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
ANTARCTIC LECTURE SERIES PRESENTS...

A CHANGING WORLD AND ITS EFFECT ON TOP LEVEL PREDATORS

LESSONS LEARNED FROM THE ANตาร์CTIC

DR. SHANE KANATOUS COLORADO STATE UNIVERSITY

To better understand what limits the adaptation of apex predators to changing ecosystems, it is necessary to understand their energetic needs. This is especially true for sentinel polar species, because current changes in climatic conditions can have immediate consequences on their prey availability. Lessons learned from our work in Antarctica have broad application to many species found across the globe.

NOV 18th
7:00 - 8:00 PM
FORT COLLINS LIBRARY
201 PETERSON ST.

THE SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
ANTARCTIC LECTURE SERIES PRESENTS...

THE TOUGHEST CREATURES IN THE WORLD

SOIL LIFE IN THE ANTARCTIC DRY VALLEYS

ASHLEY SHAW Wall Lab, Department of Biology Colorado State University

Most of Antarctica is covered by ice, but there are large snow-free areas: the McMurdo Dry Valleys, the world's most extreme desert. These valleys are some of the coldest, driest, and windiest places on earth – yet their soils are full of life. Within these soils, microscopic animals such as nematodes, tardigrades, and rotifers rule the ecosystem. How do they survive these extremely cold desert conditions? Come and learn about life in Antarctic soils, and see first-hand novel findings on the food webs, communities, and survival in this harsh ecosystem.

FEB 29th
7:00 - 8:00 PM
FORT COLLINS LIBRARY
201 PETERSON ST.

50
attendees

THE SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
ANTARCTIC LECTURE SERIES PRESENTS...

LONG-TERM ECOLOGY

What modern-day ecologists can learn about Antarctic biodiversity from heroic age exploration

DR. ERIC SOKOL INSTITUTE OF ARCTIC AND ALPINE RESEARCH UNIVERSITY OF COLORADO, BOULDER

Heroic age exploration at the beginning of the 20th century in Antarctica was about more than finding a route to the South Pole. For example, Shackleton's Nimrod expedition included a small scientific team that collected diatoms from a series of ponds at Cape Royds on Ross Island – and these samples are still preserved. Come and learn how the scientific legacy of heroic Antarctic explorers can provide modern-day ecologists with invaluable insight about the stability of Antarctica in the face of a changing world.

MAR 22nd
7:00 - 8:00 PM
FORT COLLINS LIBRARY
201 PETERSON ST.

30
attendees

50
attendees

THE SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY
ANTARCTIC LECTURE SERIES PRESENTS...

MCMURDO DRY VALLEYS, ANTARCTICA

Introduction to a Polar Desert Ecosystem

Dr. KAREN COZZETTO Post-Doctoral Research Associate, Institute of Arctic and Alpine Research, University of Colorado

At the edge of Antarctica, on the part of the continent closest to New Zealand, lie the McMurdo Dry Valleys. Discovered in 1902 by Robert Falcon Scott, William Lashley, and Edgar Evans after traveling over the polar plateau for hundreds of miles, the valleys were an unexpected ice-free surprise. Come for a virtual tour of this unique ecosystem where vast expanses of bare soils, glaciers, permanently ice-covered lakes, and summertime streams all meet to form an extreme cold desert – and the largest of Antarctica's rare, ice-free regions.

APR 19th
7:00 - 8:00 PM
FORT COLLINS LIBRARY
201 PETERSON ST.

Research Team, Fellow, Center, and Working Group Events *The School offers a significant level of event planning, design, and marketing support for faculty and student held sustainability events.*

Resident Fellow: María Fernández-Giménez

The Enclosure of the Commons and the Language of Pastoral Protest: A Trans-Historical Perspective
| 25 attendees | Sept. 10, 2015

Featuring: Daniel Eltringham, Department of English and Humanities, Birkbeck College, University of London.

Land, People, Poetry: A Reading
| 40 attendees | Sept. 23, 2015

Featuring: Matthew Cooperman, Department of English, CSU; Aby Kaupang, Fort Collins Poet Laureate; Cedar Brant, Colorado Review, CSU; and Daniel Eltringham, Department of English and Humanities, University of London.

Land, People, Poetry Network Workshops:

The Stories Around Us: Science, Art, and Everything in Between | 20 attendees | April 25, 2016

Led by John Calderazzo

Poetry Workshop | 15 attendees | May 2, 2016

Led by Dan Beachy-Quick

GCRT: Food Systems

Food Systems Fusion | Apr. 18, 2016 | 50 attendees

Featuring: Meagan Schipanski, Becca Jablonski, Michael Carolan, Ragan Adams, Cini Brown, Theresa Nogueira, and Elizabeth Ryan. IGNITE-style talks to develop food systems research networks and communication across the University. Co-hosted with CSU's One Health Initiative.

Sustainable Food Systems | Aug. 19, 2015 | 25 attendees
A workshop for CSU researchers to brainstorm research topics.

Resiliency Slam | Jun. 18, 2015 | 50 attendees
CSU researchers and community members to discuss the meaning of "resiliency" from many different perspectives.

GCRT: World Wide Views on Climate Change and Energy

Bringing Citizen Voices to the Paris Climate Talks: The World Wide Views on Climate and Energy Report
| Nov. 4, 2015 | 40 attendees

A seminar to reflect and share results, processes, and values of the June 6, 2015 global day of deliberation and consider how to continue the discussion locally in Fort Collins.

IGNITE Environmental Politics and Governance
| Mar. 21, 2016 | 50 attendees

Fast paced Ignite-style presentations on topics ranging from sciences in environmental policy making, large marine protected areas, green economy, forests, water, energy, rangelands, and climate change.

Community Voices on the Fort Collins Climate Action Plan
| Apr. 24, 2016 | 50 attendees

A citizen deliberation to discuss specific aspects and address community concerns on the ambitious Fort Collins Climate Action Plan.

GCRT: Social Sciences in Air Quality, Climate, and Health Research

Preparing for the Long Range Future: Observations from the Interface of Environmental Science and Policy
| Oct. 8, 2015 | 45 attendees

Guest lecture: Anthony Janetos, Director and professor, The Frederick S. Pardee Center for the Study of the Longer-Range Future, Boston University.

The Secret Life of Human Communication: Meaning, Message, and Behavioral Choice
| Mar. 31, 2016 | 65 attendees

Guest lecture: Susan Jasko, Professor of Communication Studies, California University of Pennsylvania.

National Smoke Warning Workshop
| Jun. 7, 2016 | 30 attendees

Workshop on creating a national warning system for wildfire smoke events.

GCRT: Hydraulic Fracturing

U.S. EPA Visit | Apr. 13, 2016

A meeting with 17 representatives from U.S. EPA Region 8 to discuss environmental impacts of hydraulic fracturing and oil and gas extraction.

GCRT: Environmental Justice CSU

Environmental Harm and Civil Resistance: Water Crisis in Northwestern China with Zhong Zhao | Oct. 1, 2015
Guest speaker: Zhong Zhao, Founder and Director of Chinese NGO Green Camel Bell, UC-Davis. Co-hosted with CSU Department of Sociology.

Environmental Justice and Citizen Science: Love Canal as a Technological Disaster | Oct. 7, 2015 | 85 attendees
Guest speaker: Lois Gibbs, Executive Director, Center for Health, Environmental and Justice, Falls Church, Virginia.

Environmental Justice: How Each of us Harms the Vulnerable | Apr. 4, 2016 | 100 attendees
Guest speaker: Kristin Shrader-Frechette, O'Neill Family Professor and Director, Center for Environmental Justice and Children's Health, University of Notre Dame.

Scientific Tricks that Polluters Use to Minimize or Cover Up Deadly Pollution | April 5, 2015 | 30 attendees
Workshop with Kristin Shrader-Frechette, O'Neill Family Professor and Director, Center for Environmental Justice and Children's Health, University of Notre Dame.

Conservation Leadership: A Speaker Series
| Nov. 2, 2015 | 60 attendees
Guest speaker: Peggy Shepard, Executive Director and Co-founder of WE ACT. Co-hosted with Warner College of Natural Resources, The Riordan Family Program of Natural Resources Environmental Leadership, and The Grimwood Heritage Fund.

Warner College of Natural Resources 544D Environmental Justice Workshop | Jan. 29, 2016 | 15 attendees
Workshop for Conservation Leadership through Learning master students.

Recovery and Resilience in the Gulf: Bouncing Back (or not) from the 2010 Gulf Coast Oil Spill | Apr. 8, 2016
Guest speaker: Brian Mayer, Associate Professor, School of Sociology, University of Arizona. Co-hosted with CSU Department of Sociology, United Chapters of Alpha Kappa Delta, CSU Center for Disaster and Risk Analysis.

A Tale of Two States: Exploring State Responses to 'fracking' in New York and Pennsylvania
| Apr. 19, 2016 | 10 attendees
Guest speaker: Damayanti Banerjee, Department of Sociology Faculty Affiliate, CSU. Co-hosted with CSU Department of Sociology.

Time for a Colorado Revolt: Elevating Community Rights Above Corporate Power | June 23, 2016 | 55 attendees
Guest speaker: Thomas Linzey, Executive Director of the Community Environmental Legal Defense Fund and co-founder of Democracy School. Co-hosted with Coloradoans for Community Rights.

Java and Justice:

Environmental Harm and Justice in China
| Sept. 30, 2015 | 8 attendees
Guest speaker: Zhong Zhao, Founder and Director of Chinese NGO Green Camel Bell, UC-Davis.

Bridging the Gap: Activists, Environmental Justice Research, and Building Trust | Oct. 8, 2015 | 10 attendees
Guest speaker: Lois Gibbs, Executive Director for the Center for Health, Environment, and Justice.

Just Resilience | Apr. 8, 2016 | 30 attendees
Guest speaker: Brian Mayer, Associate Professor for the School of Sociology, University of Arizona.

Environmental Justice Roundtable Panel Discussions:

Food Justice for All | Oct. 30, 2015 | 40 attendees
Panelists: Diana Guber, The Growing Project; Jill Harrison, Department of Sociology, CU-Boulder; Josh Shicca, Department of Sociology, CSU; and Karin Cespedes, Ethnic Studies Department, CSU.

Climate Justice for All: The Moral Imperative for Climate Action | Nov. 8, 2016 | 65 attendees
Panelists: Scott Denning, Department of Atmospheric Science, CSU; Shannon McNeeley, Natural Resource Ecological Laboratory, CSU; Susan Riederer, Climate Justice Action Ministry; and Peter Sawtell, Eco-Justice Ministries.

Health Justice for All | Dec. 8, 2015 | 10 attendees
Panelists: Jennifer Peel, Department of Environmental and Radiological Health Sciences, CSU; Sheryl Magzamen, Department of Environmental and Radiological Health Sciences, CSU; and Colleen Duncan, Department of Microbiology, Immunology, and Pathology, CSU.

Energy Justice for All | Apr. 22, 2016 | 30 attendees
Panelists: Cary Weiner, CSU Extension; Sarah T. Ramono, Political Science and International Affairs, University of Northern Colorado; Stephanie Malin, Department of Sociology, CSU; Dimitris Stevis, Department of Political Science, CSU; and David Ciptel, Department of Environmental Studies, CU-Boulder.

Just Biodiversity: Who will speak for the environment?
| May 4, 2016 | 15 attendees
Panelists: Melinda Laituri, Ecosystem Science and Sustainability, CSU; Julia Klein, Ecosystem Science and Sustainability, CSU; and Robin Reid, Center for Collaborative Conservation, CSU.

ENGAGEMENT

Global Biodiversity Center

Ignite Biodiversity | 120 attendees | Apr. 21, 2016
A fast paced, entertaining evening of IGNITE-style presentations by CSU's leading biodiversity scientists.

The Brews and the Bees: Creating a "bee friendly" Fort Collins | 60 attendees | Apr. 30, 2016
Panelists: Arathi Seshadri, Department of Soil and Crop Sciences, CSU; Boris C. Kondratieff, Department of Bioagricultural Sciences and Pest Management, CSU; Deryn Davidson, CSU Horticulture Extension Agent for Boulder County; and Lisa Mason, Department of Bioagricultural Sciences and Pest Management, CSU.

Student Sustainability Center

Sustainable Living Fair | Sept. 12-13, 2015
Participated in the planning of the fair (SSC Director sits on the fair steering committee) and organized a booth for the event.

CSU Oscar and Solar Tour | 14 Attendees | Sept. 30, 2015
Tour at the CSU Research Innovations Center to explore CSU's composting machine, better known as "Oscar" and the Foothills campus solar power plant.

"Catching the Sun" movie screening and panel discussion | ~50 Attendees | Oct. 22, 2015
A conversation with local solar experts. Co-hosted with Environmental Colorado.

"This Changes Everything" film screening and panel discussion | 90 Attendees | Nov. 12, 2015
Screening of film with panel discussion on the future of global development.

Fossil Free Film Festival | Dec. 1-12, 2015
Movie series featuring discussions from influential individuals in the CSU community and across Colorado. Co-sponsored with 350 CSU.

Climate Sweetheart Booth | 100+ Attendees | Feb. 4, 2016
Booth where students filled out "valentines cards" to send to members of congress regarding the environment. Co-sponsored with Environmental Colorado.

"New Income Streams - Distributed Energy Generation" | Feb. 25, 2016
Panel discussion with members of CSU and Fort Collins community about the future of local utilities.

Sustainable Futures Conversations | 20 Attendees | Apr. 18, 2016
Event to connect students with professionals in sustainability industries.

Earth Day Festival Booth | 200+ Attendees | Apr. 22, 2016
Annual celebration commemorating international Earth Day.

The Africa Center

New paleoclimate and paleoenvironmental records of hominin evolution at Olduvai Gorge, Tanzania | 60 attendees | Oct. 21, 2015

Guest speaker: Jackson Njau, Assistant Professor, Department of Geological Societies, Indiana University and Research Associate, The Stone Age Institute.

Africa and Ale | 40 attendees | Oct. 22, 2015
A networking event: Horse & Dragon Brewing Company brewed and donated a specialty southern Africa themed beer.

Africa's Next Harvest: Sustainable Agriculture and Biological Diversity | 130 attendees | Nov. 12, 2015
Guest speaker Calestous Juma, Director of the Science, Technology, and Globalization Project at the Better Center for Science, Harvard University.

Ebola, Zika, and Beyond: Covering Global Threats in a Globalized World | 140 attendees | Mar. 22, 2016
Guest speaker Jason Beaubien, National Public Radio Global Health and Development Correspondent.

Cheetah Conservation Fund: Scientific Research, Conservation, Education | 100 attendees | Apr. 6, 2016
Guest speaker: Laurie Marker, Executive Director and Founder, Cheetah Conservation Fund. Co-sponsored with the Department of Human Dimensions of Natural Resources, CSU.

Africa Center Faculty Seminar Series

The Paleo Diet: Carnivory and Human Evolution at Olduvai Gorge, Tanzania | 45 attendees | Oct. 1, 2015
Featuring: Michael Pante, Department of Anthropology, CSU.

Rice Bran Supplementation and Environmental Enteric Dysfunction in Mali | 25 attendees | Nov. 18, 2015
Featuring: Elizabeth Ryan, Department of Environmental Health and Colorado School of Public Health, CSU.

Development and Evaluation of Locally-Made Fertilizers in Ethiopia | 30 attendees | Feb. 4, 2016
Featuring: Jessica Davis, Department of Soil and Crop Sciences, CSU.

Aesthetic Identities: Art and Affiliation in Southern Africa | 25 attendees | Mar. 2, 2016
Featuring: David Riep, Department of Art History, CSU.

Smart Village Microgrids: Electrification and development for rural villages | 30 attendees | Apr. 12, 2016
Featuring: Daniel Zimmerle, Senior Research Associate and Director, Electric Power System Laboratory, Energy Institute, CSU.

OPERATIONS



Staff



Jarvis Choury

Fiscal and Operations
Manager



Dale Lockwood

Academic Coordinator;
Instructor, Department
of Biology



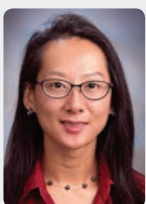
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Development Officer



Craig Starger

Research Liaison
Officer, Future Earth
Colorado Global Hub



Laurel Milliken

Information
Technology Officer,
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Aleta Weller

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Management



Brian Dunbar

Institute for the Built
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Chris Funk

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Sciences and Pest
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Department of Biology



**Kathleen Galvin
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Nancy Levinger

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Dale Lockwood

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**Jean
Morgenweck**

CSU OnlinePlus



**Howard
Ramsdell**

Department of
Environmental and
Radiological Health



**Steven
Rosenzweig**

Department of
Soil and Crop
Sciences

Jocelyn Boice

Morgan Library

OPERATIONS

Finance Report

	Budget	Actual Expenses	Credits
FY 2015-16 BASE BUDGET	\$935,314.00		
Salaries			
Employees - Director, Associate Director, Assistant Directors		\$434,386.00	
Employees - staff		\$358,318.00	
Postdoctoral Fellow		\$45,033.35	
SALARIES TOTAL		\$837,737.35	
Research			
Global Challenges Research Teams		\$69,000.00	
Resident Fellows		\$17,100.00	
TOTAL		\$86,100.00	
Sustainability Leadership Fellow Program			
Science Communication Workshop, trainings, year operations and supplies		\$28,926.58	
TOTAL		\$28,926.58	
Education			
GES101, 470, 520 and GES101 Online (professors and TAs, supplies, and trips)		\$73,745.30	
TOTAL		\$73,745.30	
Student Sustainability Center			
Salaries		\$3,369.53	
Operations and events		\$4,576.98	
TOTAL		\$7,946.51	
PROGRAM ACTIVITES TOTAL		\$196,718.39	
General Administration			
Supplies		\$16,066.02	
Operating charges (events, phone, data, etc.)		\$21,150.60	
Travel		\$34,946.12	
TOTAL		\$72,162.74	
EXPENSE TOTAL		\$1,106,618.48	
1X monies			\$55,000.00
1X Tyler Prize gift match from Central			\$56,449.48
Gift for Global Challenges Research Teams from Bohemian Foundation			\$20,000.00
Differential tuition			\$18,079.00
FY15 carryforward			\$43,155.00
Balance			\$21,379.00
Balance for future commitments in FY17 \$21,379			
Dining with Sustainability Series			
(made possible with gift from Bohemian Foundation)			
FY 2015-16 dinner series expenses	\$9,594.78	\$7,211.14	
Balance			\$2,383.64

PUBLICATIONS

Associate Director: Peter Backlund

Brown, M.E., Antle, J.M., Backlund, P., Carr, E.R., Easterling, W.E., Walsh, M.K., Ammann, C., Attavanich, W., Barrett, C.B., Bellemare, M.F., Dancheck, V., Funk, C., Grace, K., Ingram, J.S.I., Jiang, H., Maletta, H., Mata, T., Murray, A., Ngugi, M., Ojima, D., O'Neill, B., & Tebaldi, C. (2015). *Climate Change, Global Food Security, and the U.S. Food System*. 146 pp. Available from http://www.usda.gov/oce/climate_change/FoodSecurity2015Assessment/FullAssessment.pdf.

GCRT: Food Systems

Schipanski, M.E., MacDonald, G.K., Rosenzweig, S., Chappell, J., Bennett, E.M., Bezner, R., Kerr, Blesh, J., Crews, T., Drinkwater, L., Lundgren, L.G., & Schnarr, C. (2016). Realizing resilient food systems. *BioScience*. doi: 10.1093/biosci/biw052

GCRT: Hydraulic Fracturing

McLaughlin, M.C., Borch, T., & Blotvogel, J. (2016). Spills of hydraulic fracturing chemicals on agricultural topsoil: Biodegradation, sorption, and co-contaminant interactions. *Environmental Science and Technology* 50(11), pp. 6071-6078. doi: 10.1021/acs.est.6b00240

Global Soil Biodiversity Initiative

Byrne, L.B., Thiet, R.K. & Chaudhary, V.B. (2016). Pedagogy for the Pedosphere. *Frontiers in Ecology and the Environment* 14(5):238-240. doi: 10.1002/fee1286

Orgiazzi, A., Bardgett, R.D., Barrios, E., Behan-Pelletier, V., Briones, M.J.I., Chotte, J-L., De Deyn, G.B., Eggleton, P., Fierer, N., Fraser, T., Hedlund, K., Jeffery, S., Johnson, N.C., Jones, A., Kandeler, E., Kaneko, N., Lavelle, P., Lemanceau, P., Miko, L., Montanarella, L., Moreira, F.M.S., Ramirez, K.S., Scheu, S., Singh, B.K., Six, J., van der Putten, W.H., & Wall, D.H. (Eds.) (2016). *Global Soil Biodiversity Atlas*. European Commission, Publications Office of the European Union, Luxembourg. 176 pp.

Ramirez, K.S., Döring, M., Eisenhauer, N., Gardi, C., Ladau, J., Leff, J.W., Lentendu, G., Lindo, Z., Rillig, M.C., Russell, D., Scheu, S., St. John, M.G., de Vries, F.T., Wubet, T., van der Putten, W.H., & Wall, D.H. (2015). Toward a global platform for linking soil biodiversity data. *Frontiers in Ecology and Evolution* 3:91 doi: 10.3389/fevo.2015.00091

Wall, D.H., Nielson, U.N., & Six, J. (2015). Soil biodiversity and human health. *Nature* 528: 69-76 doi:10.1038/nature15744

Resident Fellow: Charles Davis

Davis, C. (in press). BLM, the administrative presidency, and policy shifts: Policy tools affecting oil and gas operations. Forthcoming, in *Review of Policy Research*

Resident Fellow: María Fernández-Giménez

Fernandez-Gimenez, M.E. (2015). "A shepherd has to invent": Poetic analysis of social-ecological change in the cultural landscape of the central Spanish Pyrenees. *Ecology and Society* 20(4):29. doi: 10.5751/ES-08054-200429.

Visiting Fellow: Karen-Beth Scholthof

Scholthof, K.-B.G. (in press). Spicing up the *N*-gene: F. O. Holmes and TMV resistance in *Capsicum* and *Nicotiana* plants. Forthcoming, in *Phytopathology*.

Working Group: Conservation Development

Miller, A.E., Goad, E., Gallo, T., Reed, S.E., Bailey, L.L. & Pejchar, L. (In press). The effect of exurban development on wintering birds in Colorado. Forthcoming, in *Wilson Journal of Ornithology*.

Reed, S.E., Calhoun, A.J.K., Farr, C., Fischer, D., Glennon, M., Hostetler, M., Kretser, H., Lerman, S., Nilon, C. & Pejchar, L. (2016). Conservation design and stewardship guidelines for local land-use regulations. Final report to the USDA Forest Service Open Space Conservation Program. Wildlife Conservation Society, North America Program, Bozeman, MT.

GRANTS

GCRT: Food Systems

Jablonski & Carolan: "Rural Wealth Creation: Exploring Food Systems-led Development Strategies", CSU Office of the Vice President for Research PRECIP (\$5,000)

Nogeire, T.: "Is 'Eating Local' the Answer? Optimizing Food System Scale to Maximize Conservation Benefits", American Fellowship, American Association of University Women (\$30,000)

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