SCHOOL OF GLOBAL
ENVIRONMENTAL SUSTAINABILITY

COLORADO STATE UNIVERSITY

2023–2024 Annual Report

SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY

In Memory of founding director Diana H. Wall

Dear Friends of SoGES,

2023-2024 was an eventful year for the School of Global Environmental Sustainability. You will find much in the way of achievements throughout this annual report. These include development of new courses that address sustainability and climate change issues, support for a wide range of interdisciplinary research projects conducted by teams and individual faculty, and multiple successful conferences and events.

Unfortunately, we also experienced a profound loss when our leader, Diana H. Wall, passed away unexpectedly on March 25, 2024. Diana was the founding director of SoGES, and it is no exaggeration to say that she created the School and everything it is today. Her leadership, brilliance, and commitment to documenting and explaining ecological changes resulting from human activities and how they affect the sustainability of the Earth's environment and human society provided the intellectual and moral framework for all of our activities and programs. Even a short list of her achievements would vastly exceed the space available for this letter (please see obituaries and appreciations published in Science, Nature, and PNAS for a thorough description).

Diana championed the value and necessity of interdisciplinary approaches for investigating complex issues. She was deeply appreciative of the critical role of the social sciences, humanities, and arts in understanding the wonder and value of the natural world, the impacts of human activities on global sustainability, and the many ways environmental conditions affect human well-being. On a personal note, she was a friend, a colleague and a mentor to me and to all our staff. We miss her deeply but are comforted by many wonderful memories, and we are determined to continue on the course she set and honor her legacy as we move forward.

The year ahead will be a period of both transition and continuity. We expect appointment of a new leader soon. SoGES is part of a new CSU initiative to expand the university's role in addressing climate change, including offering a new undergraduate certificate focused on this topic. We are also planning to enhance our efforts around understanding and reducing the loss of global biodiversity. We will welcome new and returning students and a new group of Sustainability Leadership Fellows (our 14th cohort!). We will continue our support for interdisciplinary research and curriculum development, and we have a full slate of events planned, including the first annual "Diana H. Wall Sustainability Lecture."

Thank you for your continued interest in our school and please feel free to reach out with ideas and suggestions for how we can continue to enhance sustainability research, education, and outreach at CSU.

Peter Backlund
Interim Director, SoGES

2023-24 AT A GLANCE

RESEARCH

pages 6-9

SoGES provides funding for CSU research teams and faculty fellows and conducts research supported by outside sponsors.

$60,000 was awarded by SoGES to CSU sustainability researchers
3 teams funded with **10** investigators from **8** departments across **4** colleges
18 papers submitted to journals and conferences

EDUCATION & TRAINING

pages 10-17

SoGES offers the Global Environmental Sustainability minor and three additional focused sustainability minors, conducts a graduate student training program, and oversees a set of graduate certificates.

410 students completed GES courses
207 students were enrolled in **4** undergraduate minors
75 students graduated with SoGES minors (**56** from GES, **6** from Energy, **10** from Water, and **3** from Peace and Reconciliation)
16 Sustainability Leadership Fellows from **14** departments across **6** colleges
$50,000 was awarded by SoGES and the President's Sustainability Commission to CSU faculty to support sustainability curriculum development
4 Sustainability Curriculum Innovation Grants awarded with **9** faculty from **6** departments across **6** colleges
6 Climate Change Curriculum Innovation Grants awarded with **15** faculty from **8** departments across **5** colleges

CENTERS & PROGRAMS

pages 18-21

SoGES houses and supports international programs and the Student Sustainability Center.

The **Student Sustainability Center** chapters increased engagement efforts and hosted multiple successful outreach events
The **Africa Center** hosted **6** Field Notes podcasts/blogs that highlight interdisciplinary collaboration and community based research
The **Global Biodiversity Center** worked with international and national scientists and policy makers to develop the new Global Biodiversity Framework and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
The **Global Soil Biodiversity Initiative** hosted webinars and published blogs that helped membership grow over 800 new members

ENGAGEMENT

pages 22-23

SoGES works with a wide variety of stakeholders, including the media, businesses, government agencies, and international organizations, to identify, discuss, and increase awareness of sustainability issues and ensure that sustainability research is informed by societal needs and concerns.

"Managing the Planet" panel discussions that addressed pollution, renewable energy, CSU campus sustainability, and International Climate Change Negotiations were attended by about **260** people
Special guest lecture from Eduardo Brondizio attracted an audience of **300**
The 2nd Climate Transitions Dialogue, organized by SoGES and the CSU Climate Change Initiative, gathered approx. **80** participants from CO businesses, state and local governments, and research institutions
SoGES worked with the CSU Office of International Programs to organize and host a climate change workshop for **125** international Fulbright scholars

WHO WE ARE

About the School

The School of Global Environmental Sustainability (SoGES) was created in 2008 to advance sustainability research, education, and engagement at Colorado State University. The School is a Special Academic Unit attached to the Office of the Provost and Executive Vice President that works with and across the University's eight colleges.

SoGES brings together researchers, teachers, students, and stakeholders to address one of the greatest challenges of the coming century: preserving our planet's environmental quality while meeting the human and societal needs of today and tomorrow. Our approach to this challenge is centered on exploring, documenting, and explaining the links between environmental, societal, and economic sustainability, and fostering ongoing dialogue about choices, trade-offs, and solutions.

The SoGES Mission

- **Conduct innovative research that transcends boundaries and leads to new and deeper understanding of sustainability issues**
- **Provide a challenging, integrative, and provocative education that gives future leaders knowledge and tools that enable them to contribute to environmental sustainability**
- **Engage with the public and decision-makers in translating discoveries into useful information and practical solutions to pressing environmental problems**

The challenge of achieving sustainability is inherently interdisciplinary, requiring the development and integration of knowledge, perspectives, and understanding from the natural and social sciences, engineering, business, art, and the humanities. The CSU faculty members who are affiliated with and contribute to SoGES include experts from all of these intellectual domains. Promoting and supporting discussion, connection, diversity, inclusivity, and collaboration across disciplinary and institutional boundaries is one of our School's most important functions.

Leadership

Peter Backlund, Interim Director

Peter is a science and policy researcher whose primary interests include the intersection of global change and environmental sustainability, use of scientific information for decision-making, assessment of climate change vulnerability and impacts, and evaluation of adaptation and mitigation options. His recent work has focused on understanding and documenting the impacts of climate change on food systems and food security. Before joining CSU, he held senior positions at the US National Center for Atmospheric Research, the White House Office of Science and Technology Policy, and NASA. Peter is a fellow of the American Association for the Advancement of Science and a 2016 recipient of the Abraham Lincoln Honor Award from the US Department of Agriculture. He received his B.A. from the University of New Mexico and his M.A. from The George Washington University.

Kathleen Galvin, Assistant Director of Educational Programs

Kathy is a Professor of Anthropology, Senior Research Scientist at the Natural Resource Ecology Laboratory, Director of The Africa Center, and an advising faculty member in the CSU Graduate Degree Program in Ecology. She conducts interdisciplinary human-ecological research in Africa and Asia and is interested in pastoral land use, conservation, climate variability, resilience, dryland adaptation strategies, and household decision-making under environmental uncertainty. Kathy has served on many National Research Council and National Science Foundation panels and is an Aldo Leopold Leadership Fellow. She is a Lead Author on the 2019 Global Assessment on Biodiversity and Ecosystem Services for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Her B.A. and M.A. are from CSU and her Ph.D. is from Binghamton University.

Eugene Kelly,
Faculty Research Liaison

Gene is a Professor of Pedology, Director of the CSU Agricultural Experiment Station, Associate Dean for Extension in the College of Agricultural Sciences, and former head of CSU's Department of Soil and Crop Sciences. His 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 is a current advisor to the US Department of Agriculture's National Cooperative Soil Survey and the National Ecological Observatory Network. He is a fellow of the Soil Science Society of America and a recipient of the prestigious Soil Science Society of America Research Award. He received his B.S. and M.S. degrees from CSU and his Ph.D. from the University of California-Berkeley.

EXTERNAL ADVISORY BOARD

Robert Jackson (Chair), Michelle and Kevin Douglas Provostial Professor, School of Earth Sciences, Stanford University
Rosina Bierbaum, Professor, School for Environment and Sustainability, University of Michigan
Thomas Dietz, University Distinguished Professor, Environmental Science and Policy, Sociology and Animal Studies, Michigan State University
Maggie L. Fox, Founder, MaggieFoxStrategies, LLC
Former Colorado Governor Bill Ritter, Jr., Director, Center for the New Energy Economy, Colorado State University
Osvaldo Sala (Emeritus Chair), Julie A. Wrigley and Foundation Professor, School of Life Sciences, Arizona State University
Scott J. Sternberg, Executive Director, The Boulder Economic Council and Associate Vice President of Economic Vitality, Boulder Chamber

EXECUTIVE COUNCIL

Thomas Borch, Soil and Crop Sciences
Joe Champ, Journalism and Media Communication
Tom Dean, Management
Brian Dunbar, Institute for the Built Environment
Emily Fischer, Atmospheric Science
Chris Funk, Biology and Global Biodiversity Center
Alan Knapp, Biology
Jan Leach, Agricultural Biology
Kelly Martin, Marketing
Dennis Ojima, Natural Resource Ecology Laboratory
Kenneth Reardon, Chemical and Biological Engineering
David Rojas, Environmental and Radiological Health Sciences
Elizabeth Ryan, Environmental and Radiological Health Sciences
Dave Thompson, Atmospheric Science
Joe Von Fischer, Biology

SENIOR SCHOLARS

Former Colorado Governor Bill Ritter, Jr., Director, Center for the New Energy Economy, Colorado State University
Edward B. Barbier, University Distinguished Professor, Department of Economics, Colorado State University

STAFF

Jarvis Choury, Business Officer
Darren Cockrell, Research Proposal Coordinator
Ryan Deming, Website Content Specialist and Minor Advisor
Reaghan Fields, Director, Student Sustainability Center
Dale Lockwood, Academic Coordinator; Associate Professor, Department of Biology and SoGES
Susan Melzer, Assistant Professor, Department of Soil and Crop Sciences and SoGES
Matt Norton, Fiscal Assistant Manager
Laura Shaver, Program and Events Manager
Jacob VanderRoest, Director, Student Sustainability Center Grad Chapter
Leena Vilonen, Executive Director, Global Soil Biodiversity Initiative
Aleta Rudeen Weller, Senior Research and Engagement Officer

Colorado State University's Johnson Hall, where the School is located

RESEARCH

The School of Global Environmental Sustainability is committed to finding innovative solutions to new and existing sustainability problems through rigorous scholarship and interdisciplinary expertise. SoGES is a catalyst for creative problem solving and invests in people who are willing to work towards solving sustainability grand challenges. These challenges are larger than any one academic pursuit or discipline, so solutions demand interdisciplinary collaboration.

Global Challenges Research Teams

In 2023-24 the **3** SoGES GCRTs
Submitted **18** papers to journals and conferences
Collaborated with **7** different external organizations

10 investigators | **8** departments | across **4** colleges

SINCE ITS INCEPTION, SOGES HAS FUNDED...

49 GCRTs from **52** departments **8** colleges

Fostering innovative interdisciplinary sustainability scholarship that applies to real world problems is central to the SoGES mission. To achieve this, SoGES competitively awards funding for our Global Challenges Research Teams (GCRTs), which are collaborative teams of faculty that build cross-campus partnerships to address the world's most pressing regional and global sustainability issues.

Starting in 2020, SoGES enlarged the scope of the GCRT program from annual projects to funding two-year projects that are awarded bi-annually. This change allows GCRTs to address more complex problems and provides additional time for interdisciplinary team development. The projects listed here began in the 2022-2023 academic year.

RESEARCH

Being in the Field

PRINCIPAL INVESTIGATORS:

Meena Balgopal
Department of Biology

Sara Bombaci
Department of Fish, Wildlife, and Conservation Biology

Gillian Bowser
Department of Ecosystem Science and Sustainability

Student Support: **Jessie Mader** (Department of Biology and Graduate Degree Program in Ecology), **Mel Morado** (Department of Biology and Graduate Degree Program in Ecology), **Elizabeth Diaz-Clark** (Department of Biology and Graduate Degree Program in Ecology)

This project developed a new model, Identify, Classify, and Reframe Biases (ICR-B), that has not been described elsewhere. The purpose of this model is to design Diversity, Equity, Inclusion, and Justice (DEIJ) workshops for those conducting fieldwork that center on identifying biases, determining whether they are positive or negative, and then reframing biases to assume strengths. The investigators found that most academic workshops assume that biases are always negative, but we can also have positive biases. However, in DEIJ training, leaders often assume that all participants harbor deficit-minded biases. The PIs also developed programming that goes beyond the typical structural identities of gender and race/ethnicity. The workshops addressed biases about people's work habits, age, knowledge, physical abilities, language abilities, international/domestic status, etc.

Accomplishments

- Designed and implemented a two-part workshop series for the CSU community including undergraduate students, graduate students, postdocs, research scientists, faculty members, and affiliated colleagues from National Labs. The workshop series was called Being in the Field and is grounded in as an asset-based mindset for fostering inclusion
- Drafted a manuscript that is being finalized for submission as a commentary to Conservation Biology on the asset-based mindset model

RESEARCH

Leveraging social networks and mobile technologies to promote human-carnivore coexistence

PRINCIPAL INVESTIGATORS:

Jonathan Salerno
Department of Human Dimensions of Natural Resources

Stewart Breck
Center for Human-Carnivore Coexistence

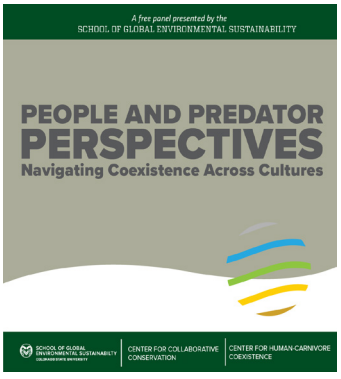
Kevin Jablonski
Department of Animal Sciences

Student Support: **Rekha Warrier** (Department of Human Dimensions of Natural Resources), **Jenn Brousseau** (Department of Human Dimensions of Natural Resources), **Andie Conlon** (Department of Human Dimensions of Natural Resources), **Emma Baker** (Department of Fish, Wildlife, and Conservation Biology), **Mary Callaghan** (Department of Ecosystem Science and Sustainability)

This project focused on understanding human culture regarding carnivore tolerance and intolerance, specifically in the context of conflict with lions in Tanzania. Integrating network data science and other forms of data to understand the cultural transmission of tolerance and shape conservation solutions. After significant delay, the Tanzania research permissions were reinstated, and Lion Landscape (LL) partners aided in mobile phone-based network study data collection. In the first wave of data collection, the project measured social networks from mobile phones in 158 households. Surveys successfully captured interacting household nodes, along with the frequent experience of livestock depredation. In the absense of network data, a theoretical agent based model (ABM) was developed to simulate lion-livestock conflict and associated tolerance led by Postdoctoral Fellow **Rekha Warrier** and Ph.D. Student **Andie Conlon**. The investigators plan to continue data collection which will enable diffusion modeling and associated outputs with funding secured from the Center for Human-Carnivore Coexistence.

Key Accomplishments

- The network modeling, along with the other scientific outputs, will be novel contributions within the human-carnivore coexistence field.
- Outreach and practitioner partnerships, primariliy with Lion Landscapes and the Center for Human-Carnivore Coexistence, helped to translate the science into impact.
- Conservation practioners from Mongolia, Brazil, and Colorado shared their experience and ideas for shaping human-carnivore coexistence strategies across different cultures in a co-hosted event with SoGES, Center for Collaborative Conservation (CCC), and the Center for Human-Carnivore Coexistence.



Wildfire Smoke Impacts on U.S. Solar Energy Resources and Agrivoltaic Systems

PRINCIPAL INVESTIGATORS:

Jesse Burkhardt
Department of Agricultural and Resource Economics

Jeffrey Pierce
Department of Atmospheric Science

Nathan Mueller
Departments of Ecosystem Science and Sustainability & Soil and Crop Sciences

Emily Fischer
Department of Atmospheric Science

Student Support: **Kimberly Corwin** (Department of Atmospheric Science), **Brooke Fitzgerald** (Department of Agricultural and Resource Economics)

This project accomplished it's three main objectives: Objective 1: Characterize the exposure of regional irradiance (i.e. solar resource potential) zones to past wildfire smoke and quantify the historical impact of wildfire smoke on capacity factors at existing solar photovoltaic plants. Objective 2: Describe future trends in fire related fine particulate matter (fire PM) relative to regional solar resource potential and estimate the change in future net PV generation due to fire PM exposure under different climate, population, and emission scenarios and for different PV technologies. Objective 3: Evaluate the net economic and productive effects on wildfire smoke on agrifoltaic systems by assessing changes in solar energy and agricultural crop productivity resulting from smoke-driven variations in surface-level solar radiation. Through the team's research they have learned about smoke exposure for agricultural workers, who cannot avoid smoke without risking their livlihood, as well as the impact of smoke on crop yields, which is essential for ensuring food security. Additionally, the team investigated the effect of smoke on solar photovoltaics (solar PV) production. This is important because as society transitions to renewable energy, with solar PV as a key generation type, we must ensure that our energy sources are not compromised by smoke. This project is playing an important role in understanding and addressing sustainability changes.

Key Accomplishments

- Development of this new interdisciplinary partnership led to several submitted papers and two published articles with an additional article currently under review.
- Graduate student, Kimberly Corwin, presented the team's work at annual conferences over two years and won a first-place oral presentation award at the 104th American Meteorological Society Annual meeting.
- Due to a collaboration fostered by the GCRT, the team has initiated a larger project involving machine learning and wildfire smoke detection. This expanded team, including new members, has received a seed grant from the Data Science Research Institute (DSRI).

EDUCATION & TRAINING

SoGES education efforts are interdisciplinary. Learning options include individual courses, undergraduate minors, and leadership training and certificates for graduate students and postdocs. The School educates and equips students with knowledge and tools to tackle sustainability challenges.

INTERDISCIPLINARY CURRICULUM

Curricula for the School's minors focus on a comprehensive understanding of the linkages between society, economics, and the environment, upon which sustainable human actions can be based. Students who complete the curriculum will be able to determine solutions to problems that have developed from human interactions with the environment.

The curriculum committee oversees curriculum development and provides guidance to the School's education efforts. It includes representatives from all eight colleges and the CSU library.

Curriculum Committee

Kathleen Galvin (Chair)	Anthropology; The Africa Center; and SoGES
Ryadi Adityavarman	Design and Merchandising
Delphine Farmer	Chemistry
Dale Lockwood	Biology and SoGES
Susan Melzer	Soil and Crop Sciences and SoGES
Erika Osborne	Art and Art History
Pinar Omur-Ozbek	Civil and Environmental Engineering
Howard Ramsdell	Environmental and Radiological Health Sciences
Lisa Stright	Geosciences
Grace Wright	College of Business

Global Environmental Sustainability Minor

The Global Environmental Sustainability (GES) minor addresses the interrelated issues of environmental, societal, and economic sustainability, including climate change, pollution, biodiversity loss, public health, environmental justice, food security, and global-scale development. Students gain deeper understanding of sustainability problems and tools to bring sustainability into their career paths. The GES minor is also available as an online option for students. **In 2023-2024 there were 152 students enrolled and 56 graduates from the GES Minor.**

Sustainability in Peace and Reconciliation Studies Minor

Peace and reconciliation are an important component of – and contributor to – societal and economic sustainability. This minor provides students with extensive background in the social, philosophical, and educational aspects of peace and reconciliation and explores their intersection with environmental sustainability. **In 2023-2024 there were 8 students enrolled and 3 graduates from the Sustainability in Peace and Reconciliation Studies Minor.**

Sustainable Energy Minor

Improving the sustainability and reducing the negative environmental impacts of energy systems requires a broad understanding of technical, environmental, and social science issues. This minor equips students with the skills and knowledge necessary to understand the challenges and opportunities in transitioning to a sustainable energy future. *Collaborative with the CSU Energy Institute*. **In 2023-2024 there were 18 students enrolled and 6 graduates from the Sustainable Energy Minor.**

Sustainable Water Interdisciplinary Minor

Issues surrounding water supply, water quality, and ecological water relationships are increasingly important as population growth continues, water uses multiply, and competition for water increases. This minor provides students with the opportunity to gain detailed knowledge about the complex challenge of sustainable water management. *Collaborative with the CSU Water Center*. **In 2023-2024 there were 29 students enrolled and 10 graduates from the Sustainable Water Interdisciplinary Minor.**

Course Offerings 2023-2024

GES 101*
Foundations of Global Environmental Sustainability

GES 120
Water in the Western US

GES 130
Introduction to Sustainability Engagement

GES 141
Introduction to Sustainable Energy

GES 280A2
Understanding Environmental Pollution

GES 330
Sustainability in Practice

GES 440
Sea Level Rise and a Sustainable Future

GES 441
Analysis of Sustainable Energy Solutions

GES 465
Sustainable Solutions to Electronic Waste Management

GES 470*
Applications of Global Environmental Sustainability

GES 520*
Issues in Global Environmental Sustainability

*** Face-to-face and online options**

A subset of GES graduates following Spring 2024 minor graduation cermony

In 2023-2024...

410
students completed GES courses

207
students are enrolled in the 4 SoGES minors

Since SoGES began education efforts in 2010...

6,333
students have completed GES courses

959
students have graduated with a GES Minor

Graduate Certificates

The graduate certificates in Applied Global Stability are designed to meet the global stability needs of senior non-commissioned officers and mid-career officers in the Special Operations Forces community, Department of Defense, USAID, Peace Corps, and other development professionals. **In 2023-2024 there were 3 students enrolled.**

EDUCATION & TRAINING

SUSTAINABILITY LEADERSHIP FELLOWS

The year-long **Sustainability Leadership Fellows (SLF) program** trains early career scientists to effectively communicate scientific findings to the media and public. The program hones professional development skills and techniques, and encourages fellows to strategically build meaningful careers that incorporate engagement and interdisciplinarity. The SLF helps the scientists that will be solving tomorrow's grand challenges of sustainability have greater impact, reach broader audiences, and think more expansively about their work and its role in the world.

Fellows took part in a 2-day intensive science communication training workshop, as well as focused workshops led by experts on a range of topics including time management, balancing science and advocacy, interacting with policy makers, media interviews, and storytelling. Additional skill-building and networking opportunities included program orientation, science communication practice with the interim University president, and both writing and peer-reviewing articles for the SoGES blog.

2023-24 saw the...

- 13th cohort
- 16 fellows
- 14 depts
- 6 colleges

2023-24 Sustainability Leadership Fellow Group Photo

SINCE INITIATION OF THE SLF PROGRAM IN 2011...

256
Fellows trained

from
33
departments

across
7
colleges

College of Agricultural Sciences

Lily Durkee
Ph.D. Candidate, Dept. of Agricultural Biology and Graduate Degree Program in Ecology ***Advisor:*** Ruth Hufbauer

Sam Leuthold
Ph.D. Candidate, Dept. of Soil and Crop Sciences and Graduate Degree Program in Ecology ***Advisor:*** Francesca Cotrufo

Huma Tariq
Ph.D. Student, Dept. of Soil and Crop Sciences
Advisor: Thomas Borch

College of Health and Human Sciences

Srijesh Pradhan
Ph.D. Candidate, Dept. of Construction Management and Civil & Environmental Engineering ***Advisor:*** Erin Arneson

College of Liberal Arts

Vedanshi Nevatia
Ph.D. Student, Dept. of Economics ***Advisor:*** Daniele Tavani

Emilia Ravetta
Ph.D. Candidate, Dept. of Sociology
Advisors: Stephanie Malin and KuoRay Mao

College of Natural Sciences

Sabari Kumar
Ph.D. Student, Dept. of Chemistry ***Advisor:*** Seonah Kim

Mj Riches
Postdoctoral Fellow, Dept. of Chemistry ***Mentor:*** Delphine Farmer

Alex Siggers
Ph.D. Student, Dept. of Biology and Graduate Degree Program in Ecology ***Advisor:*** Melinda Smith

Walter Scott, Jr. College of Engineering

Mohamed Abdelhafez
Ph.D. Student, Dept. of Civil & Environmental Engineering,
Advisor: Hussam Mahmoud

Fawzi Khalife
Ph.D. Candidate, Dept. of Civil & Environmental Engineering and Construction Management ***Advisor:*** Mehmet Ozbek

Ben Platt
Ph.D. Student, Dept. of Mechanical Engineering
Advisor: Todd Bandhauer

Alyssa Stansfield
Postdoctoral Fellow, Dept. of Atmospheric Science
Mentor: Kristen Rasmussen

Warner College of Natural Resources

Randall Bonnell
Ph.D. Candidate, Dept. of Geosciences ***Advisor:*** Dan McGrath

Samuel Lewis
Ph.D. Student, Dept. of Fish, Wildlife, and Conservation Biology
Advisor: Yoichiro Kanno

Maksim Sergeyev
Postdoctoral Fellow, Colorado Natural Heritage Program,
Mentor: Ana Davidson

ELEVEN UNIVERSITIES MEET TO STRATEGIZE LEADERSHIP TRAINING FOR GRADUATE STUDENTS IN SUSTAINABILITY

Colorado State University is a partner institution of **ANGLES: A Network for Graduate Leadership in Sustainability**, which is an innovative network of over 20 universities all committed to increasing our collective capacity to close leadership training gaps for graduate students in sustainability fields. **Aleta Rudeen Weller**, SoGES Senior Research and Engagement Officer, is the steering committee chair of the network and **Darren Cockrell**, SoGES Research Proposal Coordinator, serves as network lead.

In February 2024, eleven ANGLES institutions met in Denver, CO at the CSU-SPUR campus to develop our strengths as a network and give future sustainability experts the training they need to have a meaningful impact on global socio-environmental challenges. Over three days, the network strategized how to develop a synthesized multi-university training program that delivers leadership training to graduate students across the U.S. The network seeks to enhance cross-university collaboration and connections to solve global grand challenges. As a group of institutions, ANGLES discussed how to leverage expertise to improve existing approaches to leadership education as well as develop new programs, provide access to training for students and universities without existing leadership programs, and train-the-trainers so university leaders can bring skills to their home universities. The network will pilot its first national workshop in Fall 2024, with a goal of broadening participation by 2025.

EDUCATION & TRAINING

CURRICULUM INNOVATION GRANTS

Sustainability's global grand challenges affect everyone. It is Colorado State University's goal that all graduating students have the knowledge and tools to tackle these complex and interconnected problems in their future careers. Sustainability Curriculum Innovation Grants for faculty take initial steps toward expanding student exposure to interdisciplinary sustainability concepts across all fields of study at CSU. With these grants, CSU faculty can develop creative approaches that integrate interdisciplinary sustainability content into existing and new coursework. They elevate both the quality and quantity of student exposure to complex sustainability concepts.

SUSTAINABILITY CURRICULUM INNOVATION GRANTS

*The School of Global Environmental Sustainability, in partnership with the **President's Sustainability Commission**, competitively awards annual Curriculum Innovation Grants to faculty to expand student exposure to interdisciplinary sustainability concepts across all fields of study at CSU.*

IN 2023-2024 SUSTAINABILITY CURRICULUM INNOVATION GRANTS FUNDED -

4 projects | **9** faculty | **6** departments | across **6** colleges

CHEMISTRY FOR A SUSTAINABLE FUTURE

PROJECT LEADS:

Ed Hall
Associate Professor, Dept. of Ecosystem Science and Sustainability

Ben Reynolds
Assistant Professor, Dept. of Chemistry

Michael Bussmann
Illustrator

Chad Seidel
Animator

This project worked in collaboration with two local artists (Michael Bussmann and Chad Seidel) to develop animated vignettes (3-5 minutes) that illustrate how fundamental chemistry concepts are essential to creating a sustainable future. The primary audience for these vignettes are undergraduates in general chemistry courses as the PI's have found that general chemistry courses lack relevant connections to sustainability. The incorporation of video vignettes directly into the laboratory curriculum would have an immediate impact on a large number of undergraduate students, around 4000 per year, exposing them to fundamental connections between chemistry and sustainability early in their college careers. A central aspect of an effective curriculum is relating abstract scientific understanding concepts more familiar to students. Chemistry is central to the functioning of all the planet's ecosystems, key to sustainable solutions to the built environment, and fundamental in elements of the energy transition. However, the "invisible" nature of chemical reactions and abstract conceptual framing of chemical concepts can make it challenging to "see" the role chemistry plays in sustainability. Two animated vignettes with original art and original score were created with the funding on this grant. Using animation can help create a level of comprehension that is unachievable through text and lecture alone. The first vignette, "Fe and Phosphate: a love story", is complete and is anticipated for public use in Fall 2024. The second vignette, "The Value of Objectivity", will be completed during the 2024-2025 academic year.

Developing Course Modules on Social Equity for Civil and Environmental Engineering and Construction Management Curricula

PROJECT LEADS:

Mehmet Ozbek
Professor, Dept. of Construction Management

Rebecca Atadero
Assistant Professor, Dept. of Civil and Environmental Engineering

Erin Arneson
Assistant Professor, Construction Management

This project proposed to incorporate social equity related modules into four courses at the undergraduate and graduate levels in WCNR and HHS. In CIVE 102, students were tasked with updating a stormwater management plan, proposing strategies for multi-modal transportation, locating a new community center, and using the Envision sustainability rating system to evaluate their designs. In CIVE 103, the faculty incorporated new lectures on context and systems thinking to support students' consideration of socially sustainable aspects in their projects, using the Engineers Without Borders UK Engineering for People Design Challenge. In CON 367, students were asked to find online articles or videos about urban infrastructure, particularly related to transit or transportation, and discuss how those projects could impact less advantaged community members. Key themes that arose were low income, sustainability/health, and general lack of access. In CON 580, a new module on "Social Aspects of Decision-Making" was developed and taught, focusing on identifying criteria related to social equity and incorporating it into decision-making processes. Students were challenged to incorporate social equity criteria into their final projects. Overall, the experiences helped the Co-PIs develop further ideas how to implement social equity discussions across the curriculum. The knowledge gained through this grant the Co-PIs successfully obtained a federal grant through the US Department of Transportation. The CIG acted as a critical seed grant helping the faculty experiment with the idea of incorporating social equity into the curriculum and through the grant the team is hoping to significantly advance the sustainability curriculum in their respective departments and more broadly at CSU.

Sustainable Marketing and Consumption

PROJECT LEAD:

Christopher Berry
Assistant Professor, Dept. of Marketing

The goal of this grant was to redesign MKT 420: Marketing and Societal Well-Being to be a sustainable marketing and consumption course. The redesign will provide students a better understanding of how marketing connects to sustainability challenges and enable students to enhance sustainable marketing and consumption practices to benefit society at large. In order to satisfy the updated course title and learning objectives, substantial updates have been made to the modules and course content. Updates to the course include how marketing and consumption practices relate to the broad domain of sustainability. Specifically, the connection practices to sustainability challenges and the United Nations Sustainable Development Goals. Students will learn barriers and benefits of sustainable behavior and how to identify sustainable consumer segments and deploy strategies for engagement. This course has been a springboard for a new Sustainable Business concentration that is in development in the College of Business. This course will be a required course and a cornerstone of the program that will be offered beginning in Fall 2024.

EDUCATION & TRAINING

ECON2XX: Economics to Combat Climate Change

PROJECT LEADS:

Joanne Burgess Barbier
Special Assistant Professor, Dept. of Economics

Terrence Iverson
Professor, Dept. of Economics

Edward Barbier
Professor, Dept. of Economics

Currently, there are no courses that specifically focus on the economics of global warming and climate policies that are accessible to undergraduate students with little or no background in economics. This grant supported the development of a new introductory course, ECON 241: Economics to Combat Climate Change. The new course focuses on teaching students how to use basic economic thinking and concepts to manage important environmental sustainability problems of our times. It examines how economic approaches can be used to address environmental degradation, focusing on global warming and climate change policy. These important building blocks enable us to study and evaluate key environmental sustainability problems from an economic perspective and examine in detail a range of management issues and policy responses. This ECON241 course will not have any prerequisites, in order to fill a much-needed gap in CSU's existing curriculum, and serve a broad spectrum of undergraduate students.

CLIMATE CHANGE CURRICULUM INNOVATION GRANTS

*The School of Global Environmental Sustainability, in partnership with the **CSU Climate Initiative**, competitively awards annual Curriculum Innovation Grants to faculty to expand student exposure to interdisciplinary climate change concepts across all fields of study at CSU.*

In 2023-2024 Climate Change Curriculum Innovation Grants funded -

6 projects | **15** faculty | **8** departments | across **5** colleges

Centering Climate Change as the Unifying Theme of a Geoscience Degree

PROJECT LEADS:

Jeremy Rugenstein
Assistant Professor, Dept. of Geosciences

Sean Gallen
Assistant Professor, Dept. of Geosciences

Daniel McGrath
Assistant Professor, Dept. of Geosciences

Sara Rathburn
Professor, Dept. of Geosciences

William Sanford
Associate Professor, Dept. of Geosciences

Lisa Stright
Associate Professor, Dept. of Geosciences

Rick Aster
Professor and Dept. Head, Dept. of Geosciences

Two new linked, 200-level required courses, for the Geology major in the Department of Geosciences will be developed that center climate change as the unifying theme. These courses will teach students how climate change modifies and is modified by the various spheres (atmosphere, hydrosphere, geosphere, and biosphere) that constitute Earth's interior, surface, and atmosphere.

Building community resilience to climate-related health threats

PROJECT LEADS:

Maggie Clark
Associate Professor, Dept. of Environmental and Radiological Health Sciences

Danyel Addes
Illustrator

Stephanie Pusker
Assistant Professor, Dept. of Chemistry

This project is a new course development focused on upper-level undergraduate students in the Environmental and Public Health concentration of the Biomedical Sciences major. It focuses on community-engaged initiatives within public health to enhance community resilience to climate-related threats.

Epistemology and Values in Climate Science and Sustainability

PROJECT LEADS:

Collin Rice
Assistant Professor, Dept. of Philosophy

Katie McShane
Professor, Dept. of Philosophy

This new course will bring methods of data collection, modeling, and inferences studied by philosophers of science together with the value judgements investigated by environmental ethicists. The aim is to expand students' engagement with the topics of sustainability and climate change through both scientific and humanities lenses.

Graphic Greenprints: Sustainability Stories in Marginalized Worlds

PROJECT LEADS:

Maricela DeMirjyn
Associate Professor, Dept. of Ethnic Studies

Aparna Gollapudi
Professor, Dept. of English

This project worked to develop a new interdisciplinary undergraduate course on comics and graphic novels about sustainability and climate change, focusing particularly on the perspectives and experiences of communities of color and Indigenous peoples. The goal is to engage creatively and intellectually with experiences of climate change through issues of social justice and sustainability through creating their own graphic narratives for fostering real change in the world.

Introduction to Carbon Finance

PROJECT LEAD:

Lauren Gifford
Associate Director, Soil Carbon Solutions Center

This grant supported the curriculum development and growth of a course on climate finance that engages the nexus of climate change, finance, technology, and society. Focused towards undergraduate students, this course will introduce concepts including carbon markets and offsets, ecosystem services, natural capital investment, and more.

Introduction to Environmental Humanities

PROJECT LEADS:

Andrea Duffy
Associate Professor, Dept. of History

Sushmita Chatterjee
Professor and Dept. Chair, Dept. of Ethnic Studies

Lynn Badia
Associate Professor, Dept. of English

This grant supported the development of a new graduate course on environmental humanities. This course will enhance the curriculum of several existing graduate programs and form a core requirement of the Environmental Humanities Ph.D. program in development. Learning opportunities include how culture, narrative, communicaiton, history, and philosophy are imbricated in issues relating to the environment, climate, ecology, and energy.

CENTERS & INITIATIVES

Africa Center | africacenter.colostate.edu

Leading change for sustainable African ecosystems and societies

The Africa Center, led by **Kathleen Galvin** (Professor, Department of Anthropology and Geography, University Distinguished Professor, SoGES Assistant Director of Educational Programs), is a community of CSU faculty, students, community members, and African partners who are addressing issues of sustainability of environments and society across the African continent. The mission of the center is to foster environmental, economic, and social sustainability through teaching, research, and engagement. The research and engagement of faculty and student participants extends from art, to history, to biodiversity conservation to veterinary medicine. The center publishes a monthly newsletter, provides regular social media updates to more than 1000 people, and organizes symposia, seminars, and panel discussions, as well as monthly coffee socials and an end-of-year Africa and Ale event. The center has an executive committee of eight, three of whom are African, including one African PhD student, and employs two PhD students as webmaster and events coordinator and one undergraduate Africa Center Fellow.

2023-2024 Activity

- Awarded four $2500 graduate student scholarships to Tewabe Negash (Anthropology and Geography), Shelby Cagle (Microbiology, Immunology, and Pathology), Daniel Briggs (Fish, Wildlife & Conservation Biology), and Julia C. Munsaka (Political Science).
- Continued **Field Notes** podcast/blog as a platform for CSU researchers to highlight their work in detail and discuss cross cutting themes such as ethical cross-cultural research, interdisciplinary collaboration and community-based research. This year six podcasts/blogs were produced by students and professors.
- In March 2024, the center hosted a Graduate Student Poster Symposium showcasing amazing stories of research and engagement across the African continent. Eleven graduate students participated.

Global Biodiversity Center | biodiversity.colostate.edu

To advance understanding, conservation, and appreciation of life's variation, ranging from genetics and organisms to ecosystems and their interactions

The Global Biodiversity Center, founded in 2016, works to maintain and enhance biodiversity worldwide through research, policy advancement, education, and outreach. The center is at an exciting crossroads as they develop a new vision and strategy to maximize CSU's impact in each of these streams of activity. During it's eight years the GBC has been particularly successful in connecting CSU biodiversity researchers from several different colleges to each other to facilitate interdisciplinary collaborations, and in outreach to the Fort Collins community in the form of symposia, panels, and internationally renowned guest speakers.

The center plans on significantly increasing its focus on the science-policy interface to make sure that CSU's top-notch biodiversity researchers have the opportunity to inform national and international biodiversity policy. The center is also responding to growing scientific recognition that the climate and biodiverstiy crises are inextricably interlinked and that mitigating and adapting to climate change cannot be achieved without also dramatically curbing biodiversity loss. GBC Director, **Chris Funk** (Dept. of Biology), is increasingly focused on the US and International policy landscapes for biodiversity and climate change to identify opportunities for CSU researchers to address policy relevant research questions.

2023-2024 Activity

- Over the last year, the GBC has worked with international and national scientists and policy makers to develop the new Global Biodiversity Framework and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.
- The GBC and SoGES obtained official observer status for CSU to the United Nations Convention on Biological Diversity and will send a CSU delegation to the 16th Conference of Parties in Cali, Columbia in October 2024.

Global Soil Biodiversity Initiative | globalsoilbiodiversity.org

An worldwide effort to plan and coordinate soil biodiversity research and support soil biodiversity for the benefit of people and ecosystems

Leadership

Diana H. Wall (Scientific Chair), Colorado State University, United States
Leena L. Vilonen (Executive Director), Colorado State University, United States

SoGES houses the secretariat of The Global Soil Biodiversity Initiative (GSBI), the preeminent independent scientific group dedicated to the inclusion of science-based information on soil biodiversity and soil ecosystems in environmental policy and land management decision-making. A volunteer scientific body of experts from around the world, GSBI's 4000+ members investigate the biodiversity in soil and, through innovative research programs, measure how soil life and ecosystem functioning responds to environmental change. Members include those investigating taxonomy, soil health, biogeochemistry, anthropogenic causes of loss of soil habitat to develop education and communication programs, and develop policy. The GSBI actively pursues the cross-engagement of policy and scientific communities to build capacity across the wide range of biodiversity science.

2023-2024 Activity

- Significant planning for the 4th Global Soil Biodiversity Conference scheduled for April 12-15, 2026 in Victoria, Canada. The GSBI conference is the flagship event of the Global Soil Biodiversity Initative and has begun advertising and accepting sponsorships
- Hosted four webinars with attendees ranging from 120-340 viewers per webinar
- Published nine blogs on soil biodiversity topics ranging from soil biodiversity in agriculture, ecoacoustics to measure abundance of soil organisms, and estimating the abundance of soil organisms across the world
- Added 800 new members and sent out monthly newsletters

Colorado State University's Participation at the 2023 United Nations Climate Change Conference (COP28)

SoGES is responsible for managing CSU's participation as an official observer organization in the United Nations Framework Convention on Climate Change (UNFCCC). Eleven delegates represented CSU at the UNFCCC 28th Conference of Parties (COP28) in Dubai, United Arab Emirates. CSU co-hosted an official side event, developed an official university exhibit, and delegates took part in many other events, exhibits, and press conferences.

Panelists interact during CSU side event during COP28

CSU Side Event: The Role of Academics in Climate Policy Advice

This session, co-organized by **Hussam Mahmoud**, professor of Infrastructure at CSU and co-chair of the NASEM New Voices, explores the role played by young and senior scientific academies in providing advice to meet climate goals & solutions.

A group of CSU delegates at CSU's exhibit during COP28

CENTERS & INITIATIVES

Student Sustainability Center

A University-wide, student run organization whose mission is to empower students to advance sustainability practices and principles.

The Student Sustainability Center (SSC) supported by SoGES, which includes undergraduate and graduate chapters, is the home of student-led sustainability advocacy at CSU. The SSC leads innovative initiatives, pushes stronger campus sustainability policy, hosts topical events, distributes information, and builds cooperative community relationships.

SSC Undergraduate Student Chapter

Reaghan Fields (major: International Studies) continued her term as the Director of the SSC.

Over the course of the 2023-2024 academic year, the SSC's presence on campus and in the community grew significantly. The SSC strengthened partnerships with other sustainability organizations across campus through co-hosting multiple events. The SSC hosted monthly club meetings in addition to regular officer meetings of the **Coalition for Sustainable Student Organizations** (CSSO).

2023-2024 Highlights:

- Held a kick-off outreach event on the oval to discuss SSC- its purpose, plans, and ways for students to get involved.
- Hosted several cleanup events with other sustainability centers across campus.
- Co-hosted a holiday event where students could make decorations and gifts.
- Planted culturally significant native plants to indigenous communities in Northern Colorado.
- Worked with **The Patchwork Initiative** to co-host a clothing swap and mending workshops on campus along with other sustainability centers.
- Hosted an event that addressed the climate crisis and how it affects winter sports. Students were highly engaged and left the event with action items and feeling hopeful.
- Hosted an event on beer and sustainability with local brewers discussing how they prioritize making sustainable transitions in beer production.
- SSC **Climate Grief team** hosted an event focused on taking trash from previous SSC cleanups and turning it into art through the *Climate Grief to Active Hope* workshops.

SSC students pose with garbage bags following cleanup event

SSC members attend outreach event at City of Fort Collins Earth Day event

The Patchwork Initiative:
CSU students fight fast fashion with clothing swaps and mending workshops

Designed with the goals of reducing clothing consumption and promoting clothing restoration, The Patchwork Initiative (TPI), was started in 2022 by the SSC's previous director, Sam Moccia. It is now directed by **Reaghan Fields** and sponsored by Dept. of Design and Merchandising Associate Professor, **Sonali Diddi**.

SSC members run a mending workshop for the Patchwork Initiative

Throughout the 2023-2024 academic year the SSC hosted multiple clothing swaps and mending workshops. At TPI's clothing swaps, students exchange rather than discard unwanted clothing and the life of garments is extended beyond a single owner's use. Another way TPI is keeping fast fashion out of landfills is by teaching students how to make and mend their own wardrobes. Through monthly Make & Mend events open to students and Fort Collins community, people come together and learn from each other working on an array of projects. All of these efforts aid in the fight against fast fashion which is not only unsustainable for the environment but also disregards ethical standards regarding worker welfare and compensation. The future of fashion is circular, a closed-loop system that minimizes waste and maximizes the lifespan of clothing. The SSC's participation with The Patchwork Initiative is ongoing with hopes to expand social events and increase educational opportunities for students and the community.

SSC graduate students following outreach event

SSC Graduate Student Chapter

Jacob VanderRoest (Ph.D. Candidate Dept. of Chemistry) continued his term as Director of SSC Graduate Chapter.

The graduate chapter changed their focus over the course of the 2023-2024 academic year to increase outreach efforts to undergraduate students. A selection of club members presented at a number of sustainability courses to discuss "Sustainability in Graduate School". Students presented what it is like studying a sustainability-related topic in graduate school from a variety of disciplines.

2023-2024 Highlights:

- Organized lunchtime session with SoGES special guest lecturer **Eduardo Brondizio**. The session was attended by both undergraduates and graduate students and provided a constructive discussion about how to get "unstuck" in a research project.
- Connected with numerous local sustainability advocacy organizations and supported student outreach at multiple tabling events.
- Hosted multiple happy hour club meetings to discuss best practices and experiences in graduate school.

ENGAGEMENT

SoGES places high priority on identifying and addressing societal needs, both within our local region, and at the national and global level. Maintaining a robust dialogue among students, faculty, and stakeholders beyond the University helps us understand problems and investigate potential solutions.

COMMUNICATIONS

4,721
Email Subscribers

Social Media
2,043 Facebook Followers
2,929 X Followers

124
YouTube Subscribers

EVENTS

Managing the Planet Panel Discussions

Interactive public events that address a wide range of sustainability issues. Each features a panel of CSU experts who field questions from community members and students. **The four panels held during 2023-24 attracted about 260 participants.**

Sept. 20 **Pollution is Everywhere: what are solutions?** Panelists**: Sara Bombaci**, Dept. of Fish, Wildlife, and Conservation Biology; **Thomas Borch**, Dept. of Soil and Crop Sciences; **John Mola**, Dept. of Forest and Rangeland Stewardship; **Jeffrey Pierce**, Dept. of Atmospheric Science

Oct. 11 **The Renewable Energy Transition and What it Means for Colorado.** Panelists: **Jesse Burkhardt**, Dept. of Agricultural and Resource Economics; **Ellison Carter**, Dept. of Civil and Environmental Engineering; **Steve Conrad**, Dept. of Systems Engineering; **Carol Dollard**, Facilities Management, CSU

Nov. 8 **Sustainability in Action at CSU through the lens of Engagement and Operations.** Panel One Panelists: **Stacey Baumgarn**, Campus Energy Coordinator, CSU; **Reaghan Fields**, SoGES Student Sustainability Center; **Jacob VanderRoest**, SoGES Student Sustainability Center; **Jennifer Williams**, Facilities Management, CSU

Feb. 7 **Perspectives on COP28: Climate Change and the Future.** Panelists: **Gillian Bowser**, Dept. of Ecosystem Science and Sustainability; **Sonali Diddi**, Dept. of Design and Merchandising; **Sheryl Magzamen**, Dept. of Environmental and Radiological Health Sciences; **Hussam Mahmoud**, Dept. of Civil and Environmental Engineering; **Jacob VanderRoest**, SoGES Student Sustainability Center; **Aleta Weller**, SoGES

Africa Center Lectures

Lectures to facilitate a forum for issues of African biodiversity, conservation, and sustainability.

Sept. 12 **Fighting Poaching by Fighting Poverty Sarah Bergs**, Nourish Eco Village in South Africa

Nov. 8 **Human Diversity and Inclusive Research as a Catalyst to Effectively Protect Nature**
Women for Environment (WEA); Zilanie Gondwe, Nafeesa Esmail, Patience Gandiwa, Jamila Bargach

Apr. 11 **Climate Adaptation in Global Perspectives Mara Goldman**, CU Boulder; **Ritwick Ghosh**, University of Denver; **Julia Lee**, CSU Dept. of Political Science

Apr. 14 **Africa & Ale**

Apr. 24 **Perceived climate change impacts and adaptation in ten African mountain regions Aida Uni-Sanchez**, University of York, UK

SYMPOSIA and SPECIAL EVENTS

Sept. 25-26 Climate Transitions Dialogue

SoGES held its second Climate Transitions Dialogue (CTD) in September 2023 at the CSU SPUR facility in Denver. The goal of the CTD project is to contribute to development and implementation of effective strategies to minimize negative climate change impacts on Colorado through discussion of climate change issues among researchers and public and private sector stakeholders. The premise is that bringing scientists and stakeholders together can better inform stakeholders about new scientific insights, better inform researchers about the specific climate problems affecting Colorado communities and institutions, and help build relationships to enable new collaborations. The 2023 CTD meeting was sponsored by SoGES, the CSU Energy Institute, the CSU Climate Change Initiative, and the CSU President's Office.

The focus of the 2023 meeting was opportunities and challenges associated with improving community resilience and adaptive capacity. It attracted about 80 participants from 38 different institutions. Roughly 45 percent of participants were "stakeholders" from state and local government, businesses, and non-profit organizations, while the other 55 percent were researchers, professors, and students. The dialogue included plenary talks, expert panels, and small group discussions that addressed questions posed by organizers, panelists, and the participants themselves. Plenary talks described concerns of underrepresented communities, observed and projected changes in Colorado's climate, and CSU's climate change related activities and priorities. Panels addressed climate change impacts on Colorado, entrepreneurial approaches to climate adaptation and resilience, plans and priorities of Colorado's state government, and adaptation and resilience at the community and county level. Notable speakers and panelists included:

- **Amy Parsons**, CSU President
- **Ean Tafoya**, Colorado State Director, Green Latinos
- **Russ Schumacher**, Director, Colorado Climate Center and State Climatologist of Colorado
- **Anne Miller**, Director, Colorado Resilience Office
- **Jonathan Asher**, Director, Colorado Governor's Office of Climate Preparedness & Disaster Recovery
- **Jack Fritzinger**, CEO, Timberline Strategies
- **Kevin Brinkman**, CEO, Brinkman Real Estate and Founder and CEO, OneCanopy
- **Cathy Pagano**, Assistant County Manager for Community & Economic Development, Gunnison County
- **Heidi Pruess**, Climate Smart and Sustainability Program Manager, Larimer County

EDUARDO S. BRONDIZIO
University Distinguished Professor, Dept. of Anthropology, Indiana University
Member, National Academies of Science
2023 Volvo Environmental Prize Laureate

Feb. 27 The place of place-based actions for sustainability in Amazonia

Special guest lecturer **Eduardo S. Brondizio**, University Distinguished Professor, Dept. of Anthropology, Indiana University; Member, National Academies of Science; 2023 Volvo Environmental Prize Laureate.

This presentation provided an overview of recent and ongoing research on the emergence and experiences of place-based initiatives advancing social and environmental goals in the Brazilian Amazon. While the eyes of the world have followed the accelerated and destructive transformation of Amazonia, another remarkable, yet largely invisible, transformation has been taking place around the region. During recent decades, initiatives by rural and indigenous communities, organizations, and collaborative networks have emerged throughout Amazonia. These initiatives focus on myriad issues: rights and governance of land and natural resources, production system transitions, value-aggregation, associativism and cooperativism, gender and youth inclusion, biodiversity restoration, food security, health, and beyond. Increasingly, they have become key players in local and regional environmental governance, public goods provisioning, employment opportunities, and the regional economy. These efforts are up against tremendous socio-economic, infrastructural, political, and climate change challenges, to which they often respond through innovative institutional arrangements, new alliances and partnerships, but in many cases struggle to endure. The presentation provided a historical context to these initiatives and reflect on the extent to which place-based initiatives can be sustained and amplified in a conflictive and changing regional context. He discussed the possible role of emergent alliances and partnership between community, public, and private sectors and their role in addressing common problems and to leverage new opportunities to promote just sustainability in Amazonia.

AFFILIATE FACULTY

Becca Jablonski	Agricultural and Resource Economics
Stephan Kroll	Agricultural and Resource Economics
Andy Seidl	Agricultural and Resource Economics
Dawn Thilmany McFadden	Agricultural and Resource Economics
Cynthia Brown	Agricultural Biology
Ruth Hufbauer	Agricultural Biology
Jan Leach	Agricultural Biology
Paul Ode	Agricultural Biology
Kathleen Galvin	Anthropology
Jason Frazier	Art and Art History
Mary-Ann Kokoska	Art and Art History
Erika Osborne	Art and Art History
Elizabeth Barnes	Atmospheric Science
Scott Denning	Atmospheric Science
Emily Fischer	Atmospheric Science
Pat Keys	Atmospheric Science
Sonia Kreidenweis	Atmospheric Science
Kristen Rasmussen	Atmospheric Science
David Thompson	Atmospheric Science
Daniel Bush	Biology
Chris Funk	Biology
Cameron Ghalambor	Biology
Alan Knapp	Biology
Graham Peers	Biology
LeRoy Poff	Biology
Melinda Smith	Biology
Dale Lockwood	Biology & SoGES
Kennneth Reardon	Chemical and Biological Engineering
Anthony Rappe	Chemistry
Ravi Ravishankara	Chemistry
Aditi Bhaskar	Civil and Environmental Engineering
Suren Chen	Civil and Environmental Engineering
Neil Grigg	Civil and Environmental Engineering
Sybil Sharvelle	Civil and Environmental Engineering
Subhas Venayagamoorthy	Civil and Environmental Engineering
Martin Carcasson	Communication Studies
Scott Glick	Construction Management
Svetlana Olbina	Construction Management
Mehmet Ozbek	Construction Management
Rodolfo Valdes Vasquez	Construction Management
Ryadi Adityavarman	Design and Merchandising
Sonali Diddi	Design and Merchandising
Terry Yan	Design and Merchandising
Edward Barbier	Economics
Alexandra Bernasek	Economics
Jo Burgess Barbier	Economics
Jill Baron	Ecosystem Science and Sustainability
Rich Conant	Ecosystem Science and Sustainability
Julia Klein	Ecosystem Science and Sustainability
Melinda Laituri	Ecosystem Science and Sustainability
Dennis Ojima	Ecosystem Science and Sustainability
Chandrasekar Venkatachalam	Electrical and Computer Engineering
Dan Beachy-Quick	English
Doug Cloud	English
Jennifer Cross	Environmental Affairs and Sociology
Sheryl Magzamen	Environmental and Radiological Health Sciences
Jennifer Peel	Environmental and Radiological Health Sciences
Howard Ramsdell	Environmental and Radiological Health Sciences
Elizabeth Ryan	Environmental and Radiological Health Sciences
Del Benson	Fish, Wildlife and Conservation Biology
Kevin Crooks	Fish, Wildlife and Conservation Biology
Erica Fleishman	Fish, Wildlife and Conservation Biology
Liba Pejchar Goldstein	Fish, Wildlife and Conservation Biology
Sarah Reed	Fish, Wildlife and Conservation Biology
Robert Schorr	Fish, Wildlife and Conservation Biology
Tony Cheng	Forest and Rangeland Stewardship
Maria Fernandez-Gimenez	Forest and Rangeland Stewardship
Troy Ocheltree	Forest and Rangeland Stewardship
Courtney Schultz	Forest and Rangeland Stewardship
Rick Aster	Geosciences
Ellen Wohl	Geosciences
Ruth Alexander	History
Jane Choi	Horticulture and Landscape Architecture
Kelly Jones	Human Dimensions of Natural Resources
Brian Dunbar	Institute for the Built Environment
Joseph Champ	Journalism and Media Communication
Michael Humphrey	Journalism and Media Communication
Craig Trumbo	Journalism and Media Communication
Jonathan Carlyon	Languages, Literatures and Cultures
Amy Hoseth	Library
Tom Dean	Management
Susan Golicic	Management
Kelly Martin	Marketing
Rick Miranda	Mathematics
Jason Quinn	Mechanical Engineering
Colleen Duncan	Microbiology, Immunology and Pathology
Brian Foy	Microbiology, Immunology and Pathology
Bruno Sobral	Microbiology, Immunology and Pathology
Sue VandeWoude	Microbiology, Immunology and Pathology
Phil Cafaro	Philosophy
Katie McShane	Philosophy
Kenneth Shockley	Philosophy
Robert Duffy	Political Science
Stephen Mumme	Political Science
Kyle Saunders	Political Science
Dimitris Stevis	Political Science
Patricia Aloise-Young	Psychology
Jill Zarestky	School of Education
Michael Carolan	Sociology
Stephanie Malin	Sociology
Laura Raynolds	Sociology
Peter Taylor	Sociology
Francesca Cotrufo	Soil and Crop Sciences
Steven Fonte	Soil and Crop Sciences
Eugene Kelly	Soil and Crop Sciences
Susan Melzer	Soil and Crop Sciences
Keith Paustian	Soil and Crop Sciences
Meagan Schipanski	Soil and Crop Sciences
Thomas Borch	Soil and Crop Sciences & Chemistry
Daniel Cooley	Statistics
Donald Mykles	University Honors Program
Jennifer Barfield	Veterinary and Biomedical Sciences

PUBLICATIONS

GLOBAL CHALLENGE RESEARCH TEAMS

Leveraging social networks and mobile technologies to promote human-carnivore coexistence RESEARCH TEAM

Warrier, R., Boone, R., & **Salerno, J.** (2023). Migration land systems model: a theoretical agent-based model. Mountain Scholar. https://doi.org/10.25675/10217/236080

Salerno, J., Gaughan, A.E., Warrier, R. et al. Rural migration under climate and land systems change. Nat Sustain (2024). https://doi.org/10.1038/s41893-024-01396-6

Wildfire Smoke Impacts on U.S. Solar Energy Resources and Agrivoltaic Systems RESEARCH TEAM

Corwin, K., **Burkhardt, J.**, Corr, C., Stackhouse, P., Munshi, A., & **Fischer, E.** (2024). Solar energy resource availability under extreme and historical wildfire smoke conditions. Research Square Platform LLC. https://doi.org/10.21203/rs.3.rs-3979476/v1

Corwin, K. A., Corr, C. A., **Burkhardt, J.**, & **Fischer, E. V.** (2022). Smoke-Driven Changes in Photosynthetically Active Radiation During the U.S. Agricultural Growing Season. In Journal of Geophysical Research: Atmospheres (Vol. 127, Issue 23). American Geophysical Union (AGU). https://doi.org/10.1029/2022jd037446

Hill, A. E., **Burkhardt, J.**, Bayham, J., O'Dell, K., Ford, B., **Fischer, E. V., & Pierce, J. R.** (2023). Air pollution, weather, and agricultural worker productivity. In American Journal of Agricultural Economics (Vol. 106, Issue 4, pp. 1329–1353). Wiley. https://doi.org/10.1111/ajae.12439

2019 Future Earth, RESEARCH SCIENTIST

De Meester, L., Vázquez-Domínguez, E., Kassen, R., Forest, F., Bellon, M. R., Koskella, B., Scherson, R. A., Colli, L., Hendry, A. P., Crandall, K. A., Faith, D. P., **Starger, C. J.**, Geeta, R., Araki, H., Dulloo, E. M., Souffreau, C., Schroer, S., & Johnson, M. T. J. (2024). A link between evolution and society fostering the UN sustainable development goals. In Evolutionary Applications (Vol. 17, Issue 6). Wiley. https://doi.org/10.1111/eva.13728

FINANCE REPORT

Description	Budget	Expenses	Credits
FY 2023-2024 Base Budget	$1,233,420.00		
Salaries			
Director, Associate Directors		$435,113.00	
Staff		$468,978.00	
Student Hourlies		$5,745.00	
SALARIES TOTAL		**$909,836.00**	
Program Activities			
Research			
Global Challenges Research Teams (awarded $30,000)		$60,000.00	
Resident Fellows		$0	
Total		**$60,000.00**	
Sustainability Leadership Fellows program			
Science Communication Workshop, Trainings, and Year Operations and Supplies		$36,214.00	
Total		**$36,214.00**	
Global Soil Biodiversity Initiative			
Operating and salaries (travel, workshops, etc.)		$55,294.00	
Total		$55,294.00	
Education			
GES Traditional and Online Courses (Professors, GTAs, tuition, supplies, etc.)		$181,735.00	
Sustainability Curriculum Innovation Grants (awarded $50,000)		$45,000.00	
Total		**$226,735.00**	
Student Sustainability Center			
Salaries		$6,358.00	
Operations and Events		$3,944	
Total		**$10,302.00**	
PROGRAM ACTIVITIES TOTAL		**$388,545.00**	
General Administration			
Supplies		$24,383.00	
Operating Charges (Events, Phone, Data, Etc.)		$46,091.00	
Travel		$14,472.00	
General Administration Total		**$84,946.00**	
EXPENSE TOTAL		**$1,383,327.00**	
Miscellaneous Income			
1X Monies			$90,499.00
1X Monies from Presidents Office and Presidents Sustainability Commission			$50,000.00
Differential Tuition			$21,854.00
FY23 Carryforward			$93,632.00
Overhead budget return from grants			$3,778.00
Salary savings from external and internal CSU grants/awards			$106,312.00
Balance for Future Commitments in FY24			**$216,168.00**

Nematodes

For Diana Wall, in memoriam

Go out to the desert. Far from anyone's anywhere. There
are reasons for everything everywhere. If you want answers, look

where you are. The desert: that cold dry valley—that wide opening.
There is never nothing to look at. Never say nothing but dirt.

Say you see tan and more tan until you invent a color wheel
for tan tones. Dust rock stone tan. Ancient glacial residue tan. Tan

like the hide of some furred animal though no four-legged creature
lives in this place. Cold tan. Tan of scree and solitude. A vastness.

Begin to see differences between this patch of tan soil and
that. The human heart's a super predator—like the mind—hungry

and omnivorous. Rarely docile. Sift and sift until you find
the one solution that solves for nearly everything. See roundworms

writhing through this compaction—like only hope can move. Not at all
small when considered in context. Why imagine one massive God

when magnification reveals so many creators inside
a handful of soil. Maybe we can save the world. But we must see

first the tiny examples. Tiny habitat builders. Tiny
fixers—sequestering carbon, turning that form of harm over

and over until harm might not be a word for carbon
anymore. A trillion quadrillion microscopic lives. Tiny

change makers. Tiny predators. Tiny prey. The work of the heart—
like the work of the mind—is to build a system for survival.

Go out to the dry valley. Then come back and show us what you find—

Camille T. Dungy
May 6, 2024

INVEST IN A SUSTAINABLE FUTURE

The School of Global Environmental Sustainability facilitates vital sustainability research, educates future sustainability leaders, and brings important sustainability knowledge to the community with outreach and engagement.

- **The School's researchers, from artists to ecologists and many other varied fields of study, are working together across knowledge domains to understand the changing intersections of climate change, biodiversity loss, food security, disease, air quality, and more.**
- **Sustainability is increasingly a factor in every sector, and it's critical that we prepare CSU students to understand sustainability as they move into the workforce. The School offers coursework and a minor in Global Environmental Sustainability, available to CSU students from any major.**
- **The School helps connect CSU to our local community and Colorado at large by hosting numerous events throughout the year. SoGES sustainability events attract on average 4,000 attendees each year.**

Donations play a key role at SoGES. Your support means we can tackle the sustainability challenges facing our world – today, tomorrow, and into the future. Please consider a gift to make an impact in sustainability.

Gifts can be general in nature or dedicated to any activity listed in the annual report. Thank you for considering a donation.

https://advancing.colostate.edu/SOGES/GIVE