SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY

COLORADO STATE UNIVERSITY

2021-2022 Annual Report

SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY

Dear Friends of the School of Global Environmental Sustainability,

This report describes the research, education, and engagement activities undertaken by our school during 2021-2022. This was an exciting and challenging period for SoGES students, faculty, and staff. Pandemic conditions continued to pose major challenges, but on-campus university life continued its slow and steady re-emergence and by mid-spring we were back to hosting large in-person events that attracted substantial audiences.

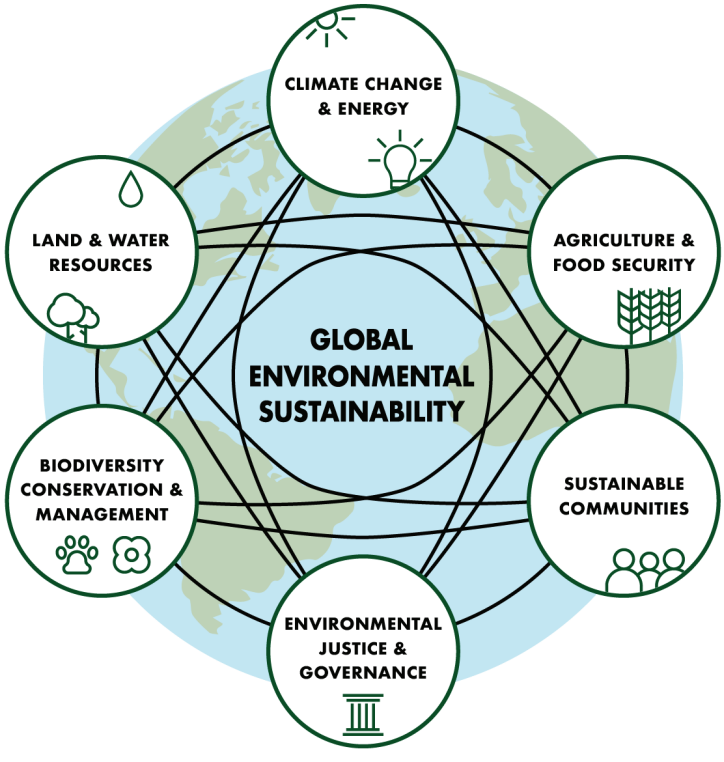
Climate change was an important theme for us throughout the year. We worked with Poudre School District to organize a high school climate change summit that attracted more than 200 students and collaborated with the CSU Office of International Programs to host a climate change conference for almost 90 Fulbright scholars from all over the world. We also worked with the CSU Energy Institute and a large group of interested faculty to initiate the Climate Transitions project, which is focused on sharing information and developing new collaborations among researchers and stakeholders to reduce climate change risks and impacts in Colorado.

We continued to support interdisciplinary research on sustainability grand challenges, providing competitive funding to three teams of CSU faculty who are assessing green solutions for the fashion industry, improving the resilience of supply chains in the face of climate change, and developing new approaches to reduce packaging waste. We increased our support for sustainability education, working with the CSU President's Sustainability Commission to create a new program to increase sustainability content in CSU's undergraduate and graduate curriculum. Seven projects involving faculty and courses from five different colleges were funded during 2021-22.

In Dec 2021, we lost a friend, advisor and External Advisory Board (EAB) Member, Dr. Tom Lovejoy, a champion of CSU, SoGES and sustaining life on earth. Tom served on the EAB since SoGES began in 2008. He pushed us to recognize the urgency of sustainability challenges and the need for SoGES to be flexible and innovative as we addressed them. We and many of our friends across CSU will miss his advice, energy, and commitment.

Thank you for your interest in and support of SoGES. As always, we welcome your ideas and suggestions for the continued development of the school.

Diana Wall, SoGES Director
Peter Backlund, SoGES Associate Director



SoGES is focused on sustainability grand challenges

ABOUT THE SCHOOL

The School of Global Environmental Sustainability (SoGES) was created in 2008 by 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 is dedicated to making the world a better place through research, education, and engagement in all aspects of sustainability.

We focus on environmental sustainability because humanity depends on Earth's environment for clean air and water, food, materials, and energy, as well as inspiration and comfort. We are vulnerable to natural hazards and rapid changes in environmental conditions. How we organize society and the way we behave as individuals has sweeping environmental impacts.

The challenge of achieving sustainability is inherently interdisciplinary and transdisciplinary. It requires insights from many perspectives, and deeper understanding of how societal, economic, and environmental problems are connected. This is why SoGES welcomes expertise from across the University, spanning natural, social, and health sciences, arts and humanities, business, and engineering.

The CSU faculty members who are affiliated with and contribute to SoGES include experts from all of these intellectual domains. SoGES cultivates new ideas, goals, and projects by promoting and supporting discussion, connection, diversity, inclusivity, and collaboration across disciplinary and institutional boundaries.

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 the knowledge and tools needed 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

Justice, Equity, Diversity, and Inclusion

Justice, equity, diversity, and inclusion are fundamental to achieving a sustainable world. Sustainability can only exist at the intersection of healthy environments, social equity, and economic fairness. Therefore, these goals are integral to our work in pursuing sustainability. To achieve them, SoGES is dedicated to embodying and exemplifying the Colorado State University Principles of Community: Inclusion, Integrity, Respect, Service, and Social Justice.

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

2021-2022 AT A GLANCE

RESEARCH

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

$60,000 awarded by SoGES to CSU sustainability researchers

3 teams funded with **13** investigators from **9** departments across **5** colleges

EDUCATION & TRAINING

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

517 students completed GES courses

229 students were enrolled in **4** undergraduate minors

71 students graduated with SoGES minors - **54** from GES, **3** from Peace and Reconciliation, **4** from Energy, **10** from Water

20 Sustainability Leadership Fellows from **13** departments across **6** colleges

7 Sustainability Curriculum Innovation Grants awarded with **14** faculty from **9** departments across **5** colleges. These grants are created in partnership with the CSU President's Sustainability Commission.

ENGAGEMENT

SoGES works with the media and diverse stakeholders to identify, discuss, and increase awareness of sustainability issues and ensure that sustainability research is informed by societal needs and concerns.

3,213 people were reached by **35** events organized and hosted by SoGES and collaborators

265 stories in popular and scientific media mentioned SoGES, with a total estimated readership of over **85 million**

CENTERS & INITIATIVES

SoGES houses two CSU centers and supports two international initiatives.

The **Global Soil Biodiversity Initiative** translated, and shared information while contributing original research to increase the soil biodiversity community network's access to the latest data and best practices. The GSBI also continued partnerships with international agencies, governing bodies, and global educational initiatives. • The **Africa Center** hosted successful online and in-person events and began fundraising for a scholarship for CSU students and to create paid fellowships for students to address specific African sustainability issues. • The **Student Sustainability Center** held 5 clothing repair workshops on campus as part of their Patchwork Initiative, and started the Graduate Student Chapter, whose goal is to be a resource for students and the community. • The **Global Biodiversity Center** was heavily involved in international biodiversity policy, particularly efforts to improve the incorporation of genetics into international frameworks and policy platforms.

PROGRAM HIGHLIGHTS

Climate Transitions Project

SoGES and the CSU Energy Institute worked with a variety of on-campus and off-campus partners to initiate the Climate Transitions project during 2021-22. This project grew out of discussions among interested faculty that were held throughout 2020-21. It is focused on identifying and developing effective responses to the challenges that climate change imposes on communities in Colorado and surrounding states. It seeks to build new connections and relationships among stakeholders who want to work together to minimize negative impacts of climate change, including academia, business, government and non-governmental organizations, and the community. The project held its first annual conference in June 2022, attracting ~125 participants to CSU for discussion and networking.

Sustainability Curriculum Innovation Grants

In partnership with the CSU President's Sustainability Commission, SoGES began a new competitive grants program to elevate the quantity and quality of sustainability content in CSU's curriculum. Open to all CSU faculty, the program provides support for developing new interdisciplinary sustainability courses and revising existing courses to add new sustainability content. Tools, modules, and other content developed through the program will be included in the Sustainability Teaching Toolkit, a repository available to faculty interested in sustainability concepts in their courses.

Poudre School District Climate Leadership Summit

On April 15, 2022, the School for Global Environmental Sustainability and Poudre School District partnered to organize and host the Climate Leadership Summit. The summit delivered an interactive experience for high school students in Northern Colorado, engaging them to learn about many aspects of climate change from some of CSU's climate science leaders. SoGES' Laura Shaver, Program and Events Manager, and Aleta Weller, Senior Research and Engagement Officer, were instrumental in the summit's planning and execution.

Climate Intervention to Cool a Warming Planet

On April 25, 2022, SoGES organized a discussion on a critical, emerging issue in climate change science and policy. Climate intervention - deliberate, large-scale intervention in the climate system designed to counter or offset the effects of global warming - received increased attention due to lack of global progress on reducing GHG emissions. In response to a 2021 report from US National Research Council on the intervention concept of Solar Radiation Management, SoGES asked two of CSU's leading thinkers on climate change, atmospheric scientist Jim Hurrell and philosopher Ken Shockley, to discuss the scientific, governance, and ethical issues surrounding this concept.

Climate Change Workshop for Fulbright Scholars

The CSU Office of International Programs and SoGES worked together to organize and host a major workshop on climate change at CSU for Fulbright scholars. The event brought 84 scholars from 49 different nations to CSU's Lory Center on April 27-30, 2022. Participants gave presentations on their own work, heard talks from CSU and other Front Range experts, and toured the CSU Powerhouse. Key topics included climate impacts for different nations, opportunities and barriers in reducing greenhouse gas, and creating effective climate change adaptation programs.

Expansion of Student Sustainability Center

The SoGES supported Student Sustainability Center (SSC) expanded during 2021-22, adding a graduate student chapter led by Jacob VanderRoest, a first-year PhD student in the Chemistry Department. The new chapter will help build a community of graduate students engaged in sustainability work at CSU and drive engagement with the greater Fort Collins community through projects and service activities.

SOGES SPOTLIGHT

CLIMATE TRANSITIONS DIALOGUE SUMMIT

On June 6-7, 2022, SoGES Associate Director Peter Backlund, on behalf of the CSU Climate Response Working Group, welcomed panelists and attendees to the inaugural Climate Transitions Dialog. The Climate Transitions Dialogue is a two-day event designed to bring together diverse voices, experiences and expertise to address local and regional climate change impacts, needs, and solutions. The event set itself apart through its primary goal of fostering dialogue between panelists and attendees, and among attendees.

Peter Backlund, summit moderator and SoGES Associate Director, speaks with a Climate Transitions Dialogue attendee. Photo: SoGES

Climate Transitions is an outgrowth of the CSU Climate Response Working Group, and proposes solutions which look at multiple pathways for effecting change, including policy and regulatory innovation, technological innovation and scaling, culture change, and education and outreach. All possibilities are framed through a strong lens of justice and equity.

For the inaugural Climate Transitions Dialog, Colorado's climate transition needs were used as a starting point for engagement.

Panels that presented were -

- The Climate Change Challenge in Colorado
- Climate Impacts & Adaptation Opportunities and Challenges
- Emissions Reduction, Sequestration, and Removal Opportunities and Challenges
- Equitable & Just Climate Transitions
- Challenges of Institutional Change in Energy & Climate Transitions

Representatives from SoGES and the CSU Energy Institute led the planning for the summit, with important contributions from CSU's Climate Adaptation Partnership, Water Center, Soil Carbon Solutions Center, Department of Forest and Rangeland Stewardship, Center for the Built Environment, and Environmental Justice Center.

Panelists included State Climatologist Russ Schumacher, Colorado Climate Center, Lisa Dilling, Professor of Environmental Studies at CU, Ned Harvey, CEO of environmental investment platform Digital Gaia, Honoré Depew, City of Fort Collins Climate Program Manager, and Conservation Colorado's Victor Galvan.

The Climate Transitions Dialogue was also a platform for water and energy utilities to discuss efforts to provide reliable services more sustainably. Bill Ritter, former Colorado Governor and Director of CSU Center for the New Energy Economy, moderated an informative and interactive panel session with Jim Lochhead, Denver Water CEO, Alice Jackson, Xcel Energy Senior Vice President, System Strategy and Chief Planning Officer, and Duane Highley, Tri-State Generation & Transmission Association CEO.

After each panel concluded, attendees were invited to ask the panelists questions. This allowed for ideas to be expanded on, and often led to spirited debate around inclusivity and effectiveness of the status quo, and inspiration for what future solutions can be. Furthering dialogue were the small group sessions scheduled between panels that gave attendees time to discuss the information and ideas presented and make new personal and professional connections. These dialogue sessions were very well reviewed by attendees and the highlight of the event for many.

The next Climate Transitions Dialogue at CSU is scheduled for April 2023. The long-term vision is to offer the Climate Transitions model as a turnkey, open-source process and suite of engagement tools that stakeholders can use to create similar partnerships, host events, and formulate climate transition strategies and roadmaps tailored to specific ecosystem needs.

(L to R) Bill Ritter (Director, CSU Center for the New Energy Economy), Alice Jackson (VP, Xcel Energy), Jim Lockhead (CEO, Denver Water), Duane Highley (CEO, Tri-State Generation & Transmission Association)

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 sustainability grand challenges. These challenges are larger than any one academic pursuit or discipline, so solving them demands interdisciplinary and transdisciplinary collaboration.

Our School provides funding for Global Challenges Research Teams, interdisciplinary projects conducted by CSU researchers. SoGES leadership and staff also conduct sustainability research projects done in collaboration with members of CSU's colleges, departments, and other academic institutions.

In 2021-2022 the 3 SoGES GCRTs

Submitted 5 papers to journals and conferences

Collaborated with 5 different businesses / groups

Secured over $820,000 in additional funding

13 investigators | **9** departments | across **5** colleges

Global Challenges Research Teams

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 with a one-year budget to funding two-year projects that are awarded bi-annually. This change allows GCRTs to address more complex problems and gives additional time for interdisciplinary team development. The projects listed here began in the 2020-2021 academic year. **Since its inception, SoGES has funded 46 GCRTs with principal investigators from 48 departments across each of CSU's eight colleges.**

ASSESSING "GREEN" SOLUTIONS TO FASHION'S CARBON FOOTPRINT

PRINCIPAL INVESTIGATORS:

Sonali Diddi
Dept. of Design and Merchandising

Zac Rogers
Dept. of Management

Richard Conant
Dept. of Ecosystem Science & Sustainability

Lumina Albert
Dept. of Management

Anders Fremstad
Dept. of Economics

The fashion industry is resource intensive. As global demand for clothing grows, it is poised to have even larger negative environmental impacts. To combat this, some modern textile producers have come up with alternative business and production models that incorporate restorative and regenerative approaches in their business strategy.

Fashion rental services, carbon farming, and online resale of used clothing have all been tried, along with many others. However, while these strategies may potentially pose a "green" solution, there is very little empirical research that demonstrates the benefits of such practices.

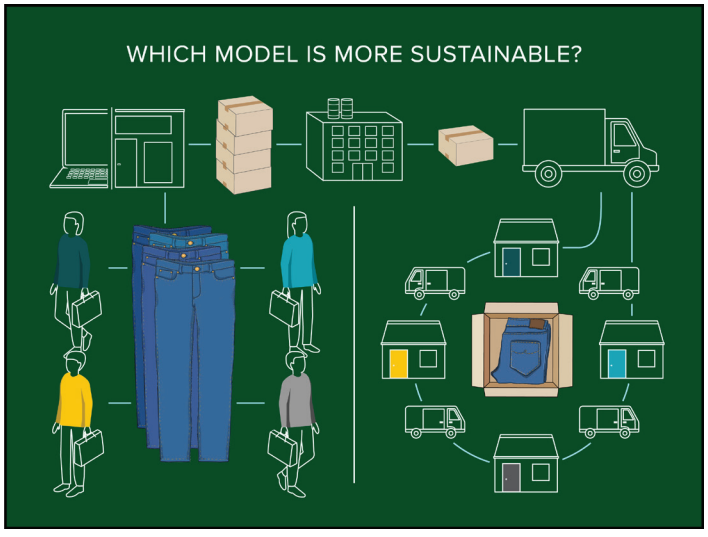
This research team, **Measuring Carbon Footprint of Alternative Business Models in the Fashion Industry**, is focused on developing an online tool to quantify the carbon impact of such alternative business models and compare them to the traditional 'take-make-use-dispose' system of the fashion industry.

Do clothing rental services reduce the fashion industry's carbon footprint?

Accomplishments

- Systematic literature review of current alternative business models in the fashion and consumer goods industries
- Developed database of life cycle analysis tools in relevant industries for data points required to build carbon footprint tool
- Worked with senior industry sustainability leaders to calculate Life Cycle Analysis of alternate business models resulting in a 50-page report. This report will be used for developing industry report and scholarly submissions.
- Collected and analyzed consumer panel data regarding their motivations, attitudes and use of fashion rental models.

The team began with the intent to use fashion industry data to investigate the claim that fashion rental services are more sustainable than the typical retail experience. Because many businesses made sustainability claims, the GCRT was confident that the businesses had data to back them up. However, they quickly discovered that no such data existed, and that fashion rental businesses were operating on the assumption that the model was more sustainable rather than collecting data to corroborate these claims.



Both traditional retail and fashion rental models have complex supply chains.

Data Collection and Industry Collaboration

Surprised by the lack of data available to verify claims of sustainable business practices, the team began collecting the data themselves. The team collected both supply chain and consumer behavior data. Doing so provided an opportunity for working directly with executive officers and other high ranking people within the fashion industry supply chain.

Participation from recognized clothing brands American Eagle and Everlane, and from Material Exchange - the world's leading online marketplace for responsible sourcing of materials and components for footwear and apparel - gave the GCRT access to industry data and further legitimized the project's scope by achieving meaningful buy-in from the companies being studied. Pivoting to data collection and industry collaboration were only possible with the increased time that the two-year grant allowed.

First-of-Its-Kind Research

As the way people consume goods continues to change and new methods of delivery are piloted and implemented, the first-of-its-kind research being done by the **Measuring Carbon Footprint of Alternative Business Models in the Fashion Industry** team can have applications across the fashion industry and beyond. In addition to analyzing consumer data on what motivates people to choose clothing rental and other access-based consumption models over retail, the team is also helping bring clarity and transparency to supply chains. The paucity of available data in many areas of the clothing industry is due to globally complex supply chains that lack transparency and have multiple supplier tiers. These factors make it extremely difficult to understand how each step impacts the carbon footprint for a pair of jeans or a sweatshirt.

> **"With a two year grant you have time to more fully understand your subject and see different narratives that are in the data"** - *Sonali Diddi, Ph.D.*

The GCRT is still compiling and analyzing the fashion industry data they collected and expect their work to make significant contributions to industry and academic knowledge on sustainable business practices. The team is developing at least three separate scenarios to calculate carbon footprint and will submit these manuscripts to journals. By fostering connections and working with the fashion industry, they also help businesses understand how increasing supply chain transparency and carbon footprint data can give them a competitive advantage with sustainability minded consumers.

Accomplishments

- Updated literature review with recent publications
- Conducted interviews with business executives to understand supply chain structure of alternative business models and innovations that advance circularity in the fashion industry
- Data analysis of survey data collected from consumers, working on different models that explain consumers motivations to adopt access based consumption (e.g. online fashion rental)
- Created scenarios working closely with industry to calculate the carbon footprint of fashion rental service and compare it with buying a new clothing item

CREATING RESILIENT INDUSTRY SUPPLY CHAINS

PRINCIPAL INVESTIGATORS:

Erin Arneson
Dept. of Construction Management

Rodolfo Valdes Vasquez
Dept. of Construction Management

Hussam Mahmoud
Dept. of Civil and Environmental Engineering

Climate change amplifies the risk of extreme weather and disaster events, affecting the way business is conducted and supply chains operate around the world. Modern supply chains are faster and more cost-effective because they utilize global resource networks, region specific production materials and techniques, and reduced inventories as part of just-in-time production strategies. However, these traits also increase the risk of disaster disruptions. Therefore, industries must adapt their global supply chains to become more sustainable and resilient when disaster disruptions occur.

The **Resilient Industry Supply Chains (RISC)** research team is focused on developing a framework for empirically assessing supply chain resilience. Their work looks at the U.S. roofing industry because roofing is one of the few common construction materials that is both produced and used domestically. Their work can be applied to other U.S. industries, improving global supply chain sustainability.

In 2020-2021, the GCRT began by building their team, meeting weekly to establish goals, share data and build connections. They also brought on and mentored five students, each with projects that related to the team's overarching research goals. By fall 2020, the team completed their preliminary data collection and analysis, and used this to run two separate studies. One study examined how roofing supply chains for Colorado commercial construction were disrupted by COVID-19. Results were published and presented in the peer-reviewed proceedings of the Associated Schools of Construction conference.

> **"Rodolfo, Hussam and I all knew each other in some way, but we were only able to work together thanks to SoGES."** - *Erin Arneson, Ph.D.*

Another study used geographic information system mapping that provided insight into how demand for construction labor and materials can surge unexpectedly after disasters. Results were published in the American Society of Civil Engineering *Journal of Management in Engineering*. In spring 2021, the team further developed their supply chain model by conducting extensive literature reviews and collecting longitudinal data for regional and national roofing supply chains. They then developed two supply chain concepts for submission to the National Science Foundation for external funding.

Accomplishments

- RISC recruited and trained five student assistants, benefiting from their help while instilling valuable team research experience
- Completed preliminary research analysis on COVID-related roofing supply chain disruptions
- Completed a study showing how construction labor and materials costs surge unexpectedly after disasters
- Published results in American Society of Civil Engineering *Journal of Management in Engineering*

Local and National Supply Chain Research

Having focused the first year of their work on sustainable building materials, the RISC team focused on sustainable supply chains in year two. The GCRT pursued two separate research streams - one study examined the impact of COVID on the entire US roofing sector. The other was a longitudinal study of the residential roofing industry in Colorado.

For their national study, the RISC team collected and analyzed data from all 50 states from the 3 years before COVID-19 and during 2020 and 2021. Results indicated that the residential and commercial roofing sectors were both negatively impacted by COVID-19, but wages and work hours were reduced more in the residential sector. This study was the first of its kind and results will be submitted as a conference paper to the Associated Schools of Construction (ASC) international conference in Fall 2022.

The Colorado focused study looked at how the housing and population boom the state has experienced over the past decade affected roofing businesses. They saw increased demand for roofing services from a limited supply of roofers and how it impacted the roofing supply chain system and jobs market. Denver's population growth has meant that a majority of new roofing jobs are in the metro area. Although demand is high, the influx of new roofers has led to more supply than required, which has lowered wages in Denver and surrounding communities.

Conversely, roofing jobs have decreased dramatically in more rural Colorado counties and the supply cannot keep up with demand. This supply chain disconnect has led to higher roofer wages in rural Colorado. Results will be submitted as a conference paper to the ASC international conference in Fall 2022.

The roofing industry is vulnerable to supply chain disruptions from natural hazards.

Broad Success and Additional Funding

The original, interdisciplinary research done by the RISC team into areas of construction management and civil engineering delivered beyond the scope of their initial grant and also has earned them further funding. The team received a $750,000 National Science Foundation grant to examine the effects of California wildfires on construction supply chains on the U.S. West Coast. Lessons learned and data from the RISC project were instrumental in developing and writing the proposal.

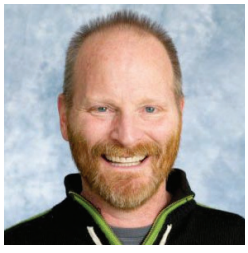
"Lessons learned and data from the RISC project were instrumental in developing and writing [our successful grant] proposal" - *Erin Arneson, Ph.D.*

Accomplishments

- Completed national study on COVID's impacts on national roofing sector. Results will be submitted as conference paper.
- Completed a statewide study on how Colorado's increased population has affected roofing supply chains. Results will be submitted as conference paper.
- Secured additional NSF funding ($750,000) to apply data and research techniques developed during RISC GCRT work to examine the effects of California wildfires on construction supply chains on the U.S. West Coast.

USING ANALYTICS TO REDUCE PACKAGING WASTE

PRINCIPAL INVESTIGATORS:



Steven Simske
Dept. of Systems Engineering

John Macdonald
Dept. of Management

Elizabeth Parks
Dept. of Communications Studies and Dialogue & Diversity Specialist with the Center for Public Deliberation

One of today's sustainability challenges is packaging waste, usually corrugated cardboard boxes, from the increased prevalence of online purchasing. Since the average corrugated box contains only 50% recycled materials, half of the fiber must still be produced anew for every box shipped. Moreover, individual consumers ordering online leads to smaller, more frequent "one-off" orders which require more packaging compared to the bulk orders made by big-box, brick-and-mortar stores. One possible solution to this challenge is reusing packaging materials multiple times, because reuse is more efficient than recycling though it is not a common practice.

The **Re-use Efficiency Packaging with Analytics for Customized Knowledge (REPACK)** research team is focused on investigating consumer willingness to participate in packaging reuse programs. The team is using a social-psychological framework that incorporates persuasion, personality types, behavior conditioning, incentives, and systems engineering. Their goal is to develop a systems model that encourages packaging reuse. Concurrently, the team is conducting a life cycle analysis of the corrugated packaging industry to ensure that the preferred behavior of incentivized consumers will result in a sustainable improvement in the packaging arena.

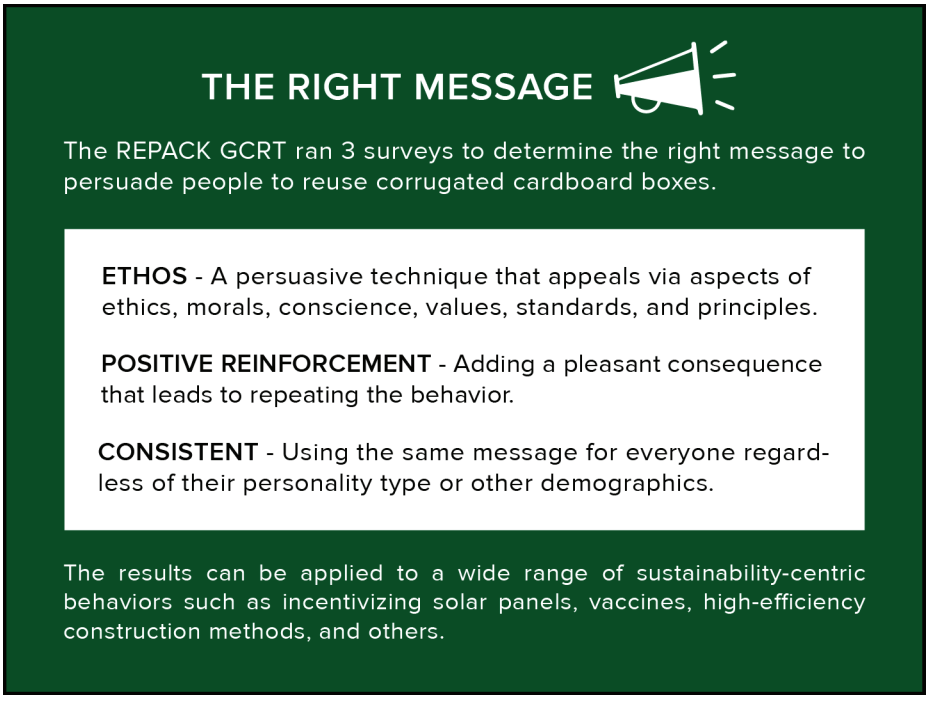
An average corrugated cardboard box is 50% virgin fibers produced from trees

Accomplishments

- Developed an online survey to collect data on social-psychological factors related to packaging reuse and recycling with questions to learn effective persuasion and behavior reinforcement, and personality type (Myers-Briggs Type Indicator).
- Completed three surveys on the adoption of reuse in the cardboard packaging industry, and summarized and analyzed the first two in a recent publication in the journal *Sustainability.*
- Brought on one student to work on the project.

Finding the Right Message

The REPACK team entered their second year with the goal of cross-validating their data to further substantiate their results and work on how the messaging should be worded. Somewhat to their surprise, the data collected told them that customized messaging was not the best way to reach people about packaging reuse or other sustainability-centric behaviors. Instead, they found that a consistent message is preferred, which has the additional benefit of being cheaper and easier to write because individuals and groups from all surveyed demographics could be reached with the same message.



The GCRT believes their survey has uses beyond behavior change communication, as well. The survey returns accurate results on determining personal beliefs, motivations, and other demographics such as Meyers-Briggs Typing with fewer questions than are normally required. The thinks it can be used to facilitate teams building and help foster consensus among diverse groups in workplace environments and elsewhere. The methodology used and their results were published in the May, 2022 edition of the journal *Sustainability*.

> **"SoGES gives students opportunities beyond what they could have had otherwise"**
> *- Steve Simske, Ph.D.*

Lifecycle Analysis and Further Funding

To better understand cardboard's carbon footprint, the student who was hired to help the REPACK team, Harshwardhan Ketkale, began used lifecycle modeling software to map out the resources required to meet global demand for CCB. Opportunities like these to gain practical skills that help complete studies and that transfer directly to the modern jobs market are unique to SoGES GCRTs.

This work helped REPACK secure around $70,000 in outside funding to apply their knowledge to other interdisciplinary projects including cybersecurity.

Accomplishments

- Developed processes that can significantly reduce the carbon footprint of the cardboard packaging industry.
- Identified the most effective approach to behavior change communication, a unified incentive approach focused on ethos and positive feedback types of persuasion.
- Published results in the May, 2022 edition of the journal *Sustainability*.
- Secured additional funding based on the demonstrated successes of the group.

LIVING IN THE ANTHROPOCENE

SoGES Lead Scientist Pat Keys examines sustainability in the Anthropocene, or the so-called "Age of Humans." In 2022, he continued work on a NASA-funded analysis of United Nations (UN) Sustainable Development Goals achievement in Kenya, with a newly funded Applied Sciences component to support decision-making around afforestation practices.

Keys discusses possible futures with Poudre School District students at the Future Earth Summit. Photo: CSU

In collaboration with project partners the Stockholm Environment Institute and the Kenya Forestry Research Institute, Keys is helping develop anticipatory capacity for how climate change may impact the sustainability of forests in the long-term. This work is being collaboratively pursued with Postdoctoral Fellow Rekha Warrier, and Professors Kathleen Galvin (Department of Anthropology) and Randy Boone (Natural Resource Ecology Laboratory). Results from this work were published in the journal *Earth Interactions*.

Additionally, the 2022 UN Human Development Report relied heavily on the theoretical framework that Keys introduced in 2019, with his Anthropocene risk framework. To support this, Keys was invited to speak on panels hosted by the United Nations Development Programme and partner organizations, to discuss the implications of new forms of risk as humanity attempts to decarbonize.

Keys delivered invited seminars to the University of Buffalo, Colby College, the Beijer Institute of Ecological Economics (Sweden), and Fernando Pessoa University (Portugal).

Pat Keys has moved on to a new role as an Assistant Professor at CSU's Department of Atmospheric Science. **We are very appreciative of his many contributions to the School of Global Environmental Sustainability and look forward to continuing to work with him in his new position.**

TELLING STORIES OF OUR POSSIBLE FUTURES

In parallel with his other work on the anthropocene, Pat Keys developed multiple projects exploring creative climate futures. Using machine learning and storytelling, Keys developed ten new scenarios of the future of the Arctic (published in *Earth's Future* in 2022).

The stories illustrate possible futures that range from positive to negative or somewhere in between. These collaborative efforts may be the first such narrative storytelling project that employs computational text analysis to gather themes about the Arctic.

Keys says that story-based scenarios can provide vital texture toward understanding the myriad possible Arctic futures.

In order to give the scenarios and stories more narrative weight, artist Fabio Comin designed illustrations for each story. Together, the words and pictures combine to evoke interest and genuine concern for how the future could look depending on the actions we take now.

Artist Fabio Comin's picture from the story "Nanook Station."

Likewise, Keys developed an interactive game that explores the future of sea level rise, in Lagos, Nigeria in the year 2199 (this work was published in *Ecology and Society*). Finally, in collaboration with colleagues at the University of Waterloo, Keys developed new methods for rapid, agile futures workshops (also published in *Ecology and Society*).

CLIMATE LEADERSHIP SUMMIT

SoGES and Poudre School District provided a forum to educate high school students on climate and sustainability

On April 15, 2022, the School for Global Environmental Sustainability and Poudre School District partnered to organize and host the Climate Leadership Summit. The summit delivered an interactive experience for high school students in Northern Colorado, engaging them to learn about many aspects of climate change from some of CSU's climate science leaders.

Northern Colorado high school students speak to their peers at the Climate Leadership Summit. Image courtesy of CSU.

The Climate Leadership Summit was organized in response to high-school students asking for more climate education. The School of Global Environmental Sustainability partnered with the students and CSU colleagues to bring climate change education to a broader community. The summit taught foundational climate science principles, and instilled the idea that everyone interacts with the climate, even if they aren't climate scientists.

Poudre School District high-school students played a major role in organizing their side of the collaborative event. From CSU, **Aleta Weller**, SoGES Senior Research and Engagement officer, and **Laura Shaver**, SoGES Program and Events Manager, organized the school's participation. **Sam Moccia** and **Jacob VanderRoest**, the Student Sustainability Center's respective undergraduate and graduate chapter leaders, advised student organizers and helped conduct the event.

On the day of the summit, close to 200 students listened to speakers and participated in breakout sessions throughout the day at the Lory Student Center. SoGES Director **Diana Wall** welcomed the students in the morning before the first keynote speaker, CSU Atmospheric Science Professor **Scott Denning**, set the stage with a message that climate change is simple, serious and solvable.

The morning breakout sessions included discussions on public health, wildlife, just transitions, agriculture, policy, air quality, economics, and climate justice. Afternoon breakouts addressed climate intervention, Colorado's climate future, a student leaders' idea exchange, and sustainable fashion.

Design and Merchandising Associate Professor **Sonali Diddi** addressed the audience about the ecological impacts of the fashion industry. She spoke about how fashion is the second largest global polluter after the oil industry, and how individuals can help lessen this impact.

Despite the potentially overwhelming size of the problems discussed, an air of optimism was still present throughout the summit. Professor Denning reminded the high-schoolers about the impact of their choices, affirmed that they do contribute to the world, and said to remember that "hope is a verb."

CSU Atmospheric Science Professor Scott Denning addresses the summit attendees. Image courtesy of CSU.

SoGES education efforts are interdisciplinary, with learning options that 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.

Curriculum development and strategy is overseen by the SoGES Curriculum Committee. It includes representatives from all eight CSU colleges and the CSU library and sets educational priorities for the School.

Curriculum Committee

Kathleen Galvin (Chair)	Anthropology; The Africa Center; and SoGES
Ryadi Adityavarman	Design and Merchandising
Pat Aloise-Young	Psychology
Joe Cannon	Marketing
Meggan Houlihan	CSU Libraries
Dale Lockwood	Biology and SoGES
Susan Melzer	Soil and Crop Sciences and SoGES
Pinar Omur-Ozbek	Civil and Environmental Engineering
Howard Ramsdell	Environmental and Radiological Health Sciences
Sara Rathburn	Geosciences

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 2021-2022 there were 221 students enrolled and 71 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 2021-2022 there were 8 students enrolled and 5 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 2021-2022 there were 19 students enrolled and 5 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 2021-2022 there were 14 students enrolled and 15 graduates from the Sustainable Water Interdisciplinary Minor.**

Course Offerings 2021-2022

Foundations of Global Environmental Sustainability
GES 101 - 328 students

Water in the Western U.S.
GES 120 - 29 students

Introduction to Sustainability Engagement
GES 130 - 10 students

Introduction to Sustainable Energy
GES 141 - 38 students

Sustainability in Practice
GES 330 - 9 students

Systems Thinking in the Anthropocene*
GES 380A2 - 9 students

Sea Level Rise and a Sustainable Future
GES 440 - 24 students

Analysis to Sustainable Energy Solutions
GES 441 - 12 students

Sustainable Solutions to Electronic Waste
GES 465 - 15 students

Applications of Environmental Sustainability
GES 470 - 9 students

Issues in Global Environmental Sustainability
GES 520 - 30 students

Bio Based Products
GES 528 - 4 students

*Experimental Courses

In 2021-2022...

517 students completed GES courses

229 students enrolled in the 4 SoGES minors

Since SoGES began education efforts in 2010...

5,462 students have completed GES courses

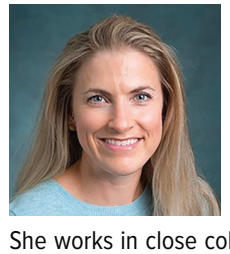
851 students have graduated with a GES Minor

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 2020-2021 there were 9 students enrolled and 2 certificates were awarded.**

Core Faculty

Dale Lockwood is the Academic Coordinator for SoGES and holds a joint appointment as Assistant Professor in SoGES and the Department of Biology. A population ecologist, his work involves the analysis of complex population dynamics of rangeland grasshoppers, modeling larval dispersal in marine organisms to better implement marine reserves, and work on the ecological genetics of plant species related to storage in seed banks. His research has been honored with one paper being named the Outstanding Paper in Genetic Resources by the Crop Society of America and another named one of the most important papers in the *Journal of Range Management* in the last 50 years. Lockwood teaches GES courses for SoGES and in the Biology Department and has been nominated for Honors Professor Award, CSU Teacher of the Year, and Greek Life Outstanding Faculty. Dr. Lockwood has a PhD in Population Biology from the University of California, Davis, a Master of Science in Applied Mathematics from the University of Arizona and a Bachelor of Science in Computer Science and Mathematics from New Mexico State University.



Susan Melzer holds a joint appointment as Assistant Professor in SoGES and the Department of Soil and Crop Sciences. Her research focuses on quantifying weathering rates and examining the impact of climate change and land-use on soil genesis, soil quality, and system resilience. She works in close collaboration with the USDA Natural Resources Conservation Service, U.S. Forest Service, and National Park Service to develop accessible educational resources and experiential learning opportunities that are data driven and will enable an integrated, applied, and transdisciplinary link between educators, researchers, managers, and students. In 2020, Melzer was named a Provost Teaching Scholar as part of the Celebrate! Colorado State Awards. Dr. Melzer has a PhD in Pedology and Biogeochemistry from Colorado State University, a Master of Science in Sedimentary Geology from the University of Colorado, and a Bachelor of Science in Geology from Colorado State University.

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.

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. With these grants, CSU faculty can develop creative approaches that integrate interdisciplinary sustainability content into existing and new coursework. The grants also provide a mechanism to share expertise and tools across colleges and courses through development of a sustainability curriculum toolkit that is accessible by every educator on campus.

In 2021-2022 SoGES Curriculum Innovation Grants funded -

7 projects | **14** faculty | **9** departments | across **5** colleges

ECON240: Economics of Environmental Sustainability

PROJECT LEAD:

Joanne Burgess Barbier
Assoc. Professor, Dept. of Economics

Economics can help us understand the relationship between the economy and environmental degradation and management. To enrich students' learning in this area, this project updated and refocused an existing course, ECON240, to increase emphasis on sustainability. The course now thoroughly addresses the economics of environmental sustainability, including initial concept (i.e., defining the systems approach and the economists' capital approach to sustainability), how economics approaches the underlying causes of environmental degradation, application towards environmental problems, and policy implications for sustainable economic development.

The course is designed for students with little or no background in economics and explores complex interdisciplinary concepts related to environmental sustainability. The ECON240 curriculum toolkit was updated to better reflect the economics of environmental sustainability, including: syllabus, rubrics, worksheets, classroom exercises, discussion topics, quiz bank, exam bank, links to videos, podcasts and blogs, and canvas course template material.

"The reorientation of ECON 240 to focus on the economics of environmental sustainability addresses the Green and Gold mission of CSU."

Updating ECON240 to be sustainability focused was in the planning phases for some time, and receiving the Curriculum Innovation Grant allowed the work to be completed. The project will benefit CSU faculty as well, providing professors and Graduate Teaching Instructors (GTIs) in the Department of Economics who teach this course with a more effective curriculum toolkit for ECON240 that focuses on the economics of environmental sustainability.

Circular Economics for the Built Environment

PROJECT LEADS:

John Killingsworth
Asst. Professor,
Dept. of Construction Management

Zachary Schaller
Asst. Professor, Dept. of Economics

The process of creating and maintaining the built environment (e.g., homes, commercial buildings, infrastructure) consumes more energy and produces more waste than any other industry. The emerging discipline of Circular Economics can be a useful tool in tackling these sustainability impacts since it addresses systemic challenges such as climate change, waste, natural resource management, supply-chain management, and pollution.

For this project a new course at CSU was developed that featured Circular Economics as a guiding theme. The course, *Circular Economics in the Built Environment*, is crosslisted for both undergraduates and graduates. It was developed as part of the Construction Management program, but has also received interest from Systems Engineering.

The team has started developing curriculum, building a resource library, and has identified an excellent case-study, the California Academy of Sciences building in San Francisco, California. The grant funding allowed them to visit and take an in-depth tour of the

"We could not have collected the wealth of information for the case study without this funding"

double-platinum LEED rated building. While there, they met with the structural engineer, the facilities engineers, and the general contractor, making connections with people who will serve as resources for years to come.

A Radical Library of Ceramic Materials

PROJECT LEADS:

Del Harrow
Professor, Dept. of Art and Art History

Lynn Badia
Asst. Professor, Dept. of English

The clays, glazes, and other chemicals used in pottery-making have profound social-environmental-economic impacts that are often overlooked. The materials must be mined, refined, and may travel thousands of miles via complex global distribution networks.

This project helps ceramics students directly engage concepts of sustainability by educating them on the specific origins of the materials they use. The team made a series of short videos about each substance in the pottery materials lab, tracing their geologic origins and illuminating their sustainability impacts. Each video is accessible by a QR code in the lab, along with additional research and information, resulting in an augmented and annotated materials library.

"This program has been incredibly valuable and generative, allowing us to create an original installation in the Pottery Lab that supports the creation of new artistry and research at CSU"

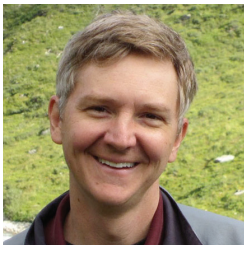
Grant funding was also used to build an online interactive map/ research tool to give users more ways to experience their library. Users can search and compile data according to individual research queries. They partnered with Geospatial Centroid - CSU's center for geospatial technologies - to design a visually appealing interface that spatially locates each material's history on a three-dimensional rendering of the Earth. With this, viewers can better visualize each material's story – its extraction location, global transportation, place in geologic history, and connection to current ecological and political events.

Development and Integration of Sustainability Concepts into Introductory-Level Geoscience

PROJECT LEADS:

Sean Bryan
Senior Instructor, Dept. of Geosciences

Sean Gallen
Assoc. Professor, Department of Geosciences



Michael Ronayne
Assoc. Professor, Department of Geosciences

Lisa Stright
Assoc. Professor, Department of Geosciences

The geosciences play a key role in many of the sustainability grand challenges that affect our world. Mineral, water, and energy resources are under pressure, and communities are being impacted by hazards from flooding, mass wasting (e.g. landslides), and sea level rise.

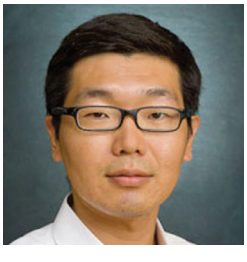
This grant allowed the Geosciences team to collaborate on the development and creation of materials that will be shared across all introductory geosciences courses, including three AUCC courses that reach over 1,500 students per year. Six new curricular modules were created, which focus on energy resources, mineral resources, water resources, flooding hazards, mass wasting hazards, and ice Loss and sea-level rise. The modules include teaching notes, presentation slides, assessment questions, and in-class and homework activities.

"This grant allowed us to collaborate and dedicate time necessary to develop curricular materials that will be shared across our courses"

The new modules will advance understanding of sustainability in the geosciences, and improve the overall learning in introductory geology. The modules will be revised based on instructor and student feedback, and submitted to the SoGES toolkit.

Finance for a Better World

PROJECT LEAD:



Tianyang Wang
Assoc. Professor, Dept. of Finance and Real Estate

In the wold of business, Environmental, Social, and Governance (ESG) criteria are becoming important for investors, consumers, managers, and regulators. Increasingly, many institutional investors and other stakeholders strongly favor investment in companies that provide ESG performance reporting. However, due to the ESG framework's relatively new status in the mainstream, many businesses struggle to measure and report these metrics to key stakeholders.

"The advancement of sustainability curriculum lets our students learn the essential components of the ESG market and the environmental, social, and governance factors changing the business world."

There is a strong need to prepare students to incorporate ESG thinking in their careers and help businesses carry out ESG investing goals. This project developed curriculum in finance courses that introduced students to new advances in the ESG framework and sustainability in the business world.

Global Product Flows: A Teaching Toolkit for Integrating Supply Chain Management and Sustainability

PROJECT LEAD:

John Macdonald
Assoc. Professor, Dept. of Management

Recent disruptions of supply chains have highlighted not only the global nature of product flows in the 21st century, but also the need for resilient and sustainable supply chain management (SCM) solutions. The economic dimension of sustainability is inherently built into business curriculum. However, many environmental and social aspects of SCM are left unexplored or minimally covered, such as sustainable purchasing, product life cycle management, humanitarian logistics for refugees, illicit supply chains, (e.g., wildlife and labor trafficking), and more.

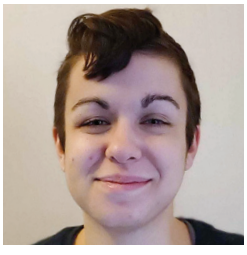
"There is such a hunger among students to make a difference. It was exciting to develop this material and see the impact it had on student learning in sustainable supply chains."

This project created a suite of learning tools—lecture material, assignments, tests, cases—that reveal the systemic interconnections of sustainability concepts in SCM and how pulling one 'lever' affects other interdependent outcomes. With it, instructors can focus on supply chain sustainability aspects, including presentations, class activities, a test bank, and a list of additional external resources.

Sustainability-in-LIFE: Infusing Sustainability Principles and Science Into the Introductory Biology Curriculum at CSU

PROJECT LEAD:

Tanya Dewey
Asst. Professor, Dept. Biology



Ren García-Hellmuth
Professional Science Masters in Zoo, Aquarium, and Animal Shelter Management

Kim Hoke
Professor, Dept. Biology

Large enrollment biology courses are an opportunity to describe the relevance of sustainability in daily life and in solutions to humanity's current and future challenges. The Sustainability-in-LIFE project created sustainability focused, inquiry-driven lab activities for two of the highest enrollment natural science courses at CSU: LIFE 102 and 103. These new lab activities will introduce CSU's large student audience to the interdisciplinary aspects of sustainability science.

For LIFE102, three new labs were written and two new lab activities were added. The new labs and activities include algae blooms and dead zones, ocean acidification, carbon dioxide uptake via photosynthesis, anthropogenic factors influencing species conservation, desalination technologies, and the positive and negative environmental impacts of various GMOs.

"We appreciated the flexibility to adjust our objectives as the project evolved"

For LIFE103, new sustainability-centered activities were written for five existing labs. These covered topics such as climate change effects on plant evolution and glucose production, the use of fungi to filter environmental pollutants, using fungi as an alternative sustainable material, and the importance of microbes in ecosystems and bioremediation.

LEADERSHIP TRAINING FOR EARLY CAREER SUSTAINABILITY SCIENTISTS

2021-2022 saw the 11th SLF cohort with 20 Fellows from 13 departments across 6 colleges

The year-long **Sustainability Leadership Fellows (SLF) program** hones professional development skills and techniques, and encourages early career sustainability scientists to strategically build meaningful careers that incorporate engagement and an interdisciplinary approach to their work. 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.

Sustainability Leadership Fellows take part in intensive science communication trainings, including a workshop run by science communication specialists COMPASS, and five workshops led by experts on a wide range of topics. These trainings cover skills including time management and workload optimization, interacting with policymakers, balancing science and advocacy, discussing scientific findings with skeptical audiences, and creating an inclusive team culture. Additional skill-building and networking opportunities include program events, and writing and providing peer-reviews for articles on the SoGES blog.

The SoGES SLF program is a part ANGLES, a network of universities in the United States and Canada (see page 24). The ANGLES network shares educational resources and best-practices to grow the capacity for collective leadership on sustainability by improving leadership development in graduate education.

Nancy Baron, COMPASS Director of Science Outreach, steps down after 22 years

Nancy Baron. Photo: Compass

COMPASS is an independent organization that provides science communication training. COMPASS has helped prepare each SLF cohort to skillfully speak about the work they're doing and why it matters with both the media and their neighbors.

For the last 22 years, Nancy Baron has played a part in those efforts as Director of Science Outreach. In this role at COMPASS, Nancy has advocated for scientists to come out of their ivory towers and learn how to interact and converse with the media, and reach everyday people with the results of their work. Her final training was with SoGES SLF Program, and the school is thankful for all that she imparted in her time at COMPASS.

Members of the 21-22 SLF cohort. Photo credit: Brendon Anthony

College of Agricultural Sciences

Jessa Ata
Ph.D. Candidate, Dept. of Agricultural Biology,
Advisor: Jane Stewart

Shaista Karim
Ph.D. Candidate, Dept. of Agricultural Biology,
Advisor: Amy Charkowski

Katherine Rocci
Ph.D. Candidate, Dept. of Soil and Crop Sciences and the Graduate Degree Program in Ecology,
Advisor: Francesca Cotrufo

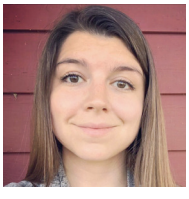
Brendon Anthony
Postdoctoral Fellow, Dept. of Horticulture and Landscape Architecture,
Mentor: Ioannis Minas

Logan Thompson
Postdoctoral Fellow, Dept. of Animal Science,
Mentor: Kim Stackhouse-Lawson

College of Health and Human Sciences

Shantanu Kumar
Ph.D. Candidate, Dept. of Construction Management and Civil and Environmental Engineering, **Advisor:** Mohammed Mehany

College of Liberal Arts



Shae Rupinsky
Ph.D. Student, Dept. of Political Science,
Advisor: Susan Opp

Warner College of Natural Resources

Elodie Le Cornu
Ph.D. Candidate, Dept. of Human Dimensions of Natural Resources,
Advisor: Rebecca Gruby

Anna Clare Monlezun
Ph.D. Student, Dept. of Ecosystem Science and Sustainability,
Advisor: Stacy Lynn

Katie Nigro
Ph.D. Candidate, Dept. of Forest and Rangeland Stewardship and Graduate Degree Program in Ecology,
Advisor: Miranda Redmond

Brianna Rick
Ph.D. Candidate, Dept. of Geosciences,
Advisor: Daniel McGrath

Sarah Whipple
Ph.D. Candidate, Dept. of Ecosystem Science and Sustainability and Graduate Degree Program in Ecology,
Advisor: Gillian Bowser

Andreas Wion
Ph.D. Candidate, Dept. of Forest and Rangeland Stewardship and Graduate Degree Program in Ecology,
Advisor: Miranda Redmond

Annie Kellner
Ph.D. Candidate, Dept. of Fish, Wildlife and Conservation Biology and Graduate Degree Program in Ecology,
Advisors: George Wittemyer and Stewart Breck

Walter Scott, Jr. College of Engineering

Rehman Lund
Ph.D. Student, Dept. of Civil and Environmental Engineering,
Mentor: Joseph Scalia IV

College of Natural Sciences

Amanda Cicchino
Ph.D. Student, Dept. of Biology and the Graduate Degree Program in Ecology,
Advisor: W. Chris Funk

Mariel Price
Ph.D. Candidate, Dept. of Chemistry,
Advisor: Garret Miyake

Holly Roth
Ph.D. Candidate, Dept. of Chemistry,
Advisor: Thomas Borch

Fionna Samuels
Ph.D. Candidate, Dept. of Chemistry,
Advisor: Nancy Levinger

Leena Vilonen
Ph.D. Candidate, Dept. of Biology and Graduate Degree Program in Ecology,
Advisor: Melinda Smith

SINCE THE SLF PROGRAM BEGAN IN 2011...

220 Fellows trained

from **33** departments

across **7** colleges

SLF Honors and Recognition

Sustainable Leadership Fellow alums Gretchen Kroh and Xoco Shinbrot were awarded an AAAS Science & Technology Policy Fellowship (STPF). Kroh was awarded a placement at the USDA Office of the Chief Scientist, and Shinbrot was awarded a placement at the NSF Office of Polar Programs.

Shinbrot, a member of the 2016-17 cohort, and Kroh, 2018-19, will spend a year serving professionally in federal agencies and congressional offices as a Science & Technology Policy Fellow.

The fellowship program is part of the American Association for the Advancement of Science (AAAS) mission to advance science and serve society. The program supports evidence-based policymaking by leveraging the knowledge of science and engineering experts, and fosters leaders for a strong U.S. science and technology enterprise.

ANGLES NETWORK EXPANDS LEADERSHIP TRAINING ACROSS NORTH AMERICA

SoGES co-leads and is the administrative home of ANGLES – a network of universities in the U.S. and Canada working together to accelerate and improve sustainability-focused leadership development in graduate education.

Making progress on sustainability challenges requires people with deep expertise and leadership capabilities. The world needs leaders with skills beyond those in their degree program; skills that can help them apply their knowledge effectively, understand stakeholder needs, work collaboratively, communicate outside their discipline, make decisions in the face of ambiguity, be adaptable and resilient, affect policy, foster equity and justice, and more.

ANGLES aligns the diverse efforts to develop graduate students as sustainability leaders and societal change agents. By providing a framework for mentorship, sharing best practices and curriculum, and more, the network raises the impact of individual graduate leadership programs and expands the landscape of training opportunities.

SoGES believes there can never be too many experts with the tools and skills required to fight for a more sustainable world. As a leader of ANGLES, SoGES supports emerging sustainability leadership programs, and draws on the network for ideas to improve the Sustainability Leadership Fellows program.

The 7 key aptitudes of sustainability leaders, developed by ANGLES.

SoGES houses an international initiative and supports three CSU centers

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.

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 (GBC) works to maintain and enhance biodiversity through research, policy advancement, education, and outreach at CSU.

Global Biodiversity Center staff were heavily involved in international biodiversity policy this past academic year, particularly efforts to improve the incorporation of genetics into the UN Convention on Biological Diversity (CBD) post-2020 Global Biodiversity Framework and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

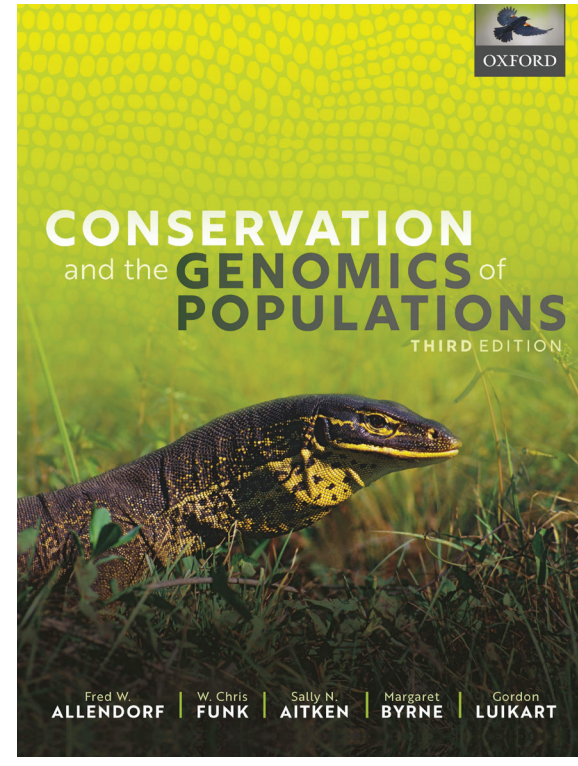
2021-2022 Highlights:

- GBC Director Chris Funk is a member of The Group on Earth Observations Biodiversity Observation Network (GEO BON), Genetic Composition Working Group (GCWG), and IUCN Conservation Genetics Specialist Group, and worked with these organizations to advocate for more actionable genetic targets, goals, and indicators for all species, not just agricultural species.
- The Global Biodiversity Center hosted seminars for CBD representatives, country and NGO focal points, attended CBD meetings, and developed peer-reviewed papers and policy-relevant documents for stakeholders in the CBD.
- Chris Funk and colleagues published a paper in Biological Reviews on suite of Essential Biodiversity Variables (EBVs) for monitoring genetic diversity status and trends.

"SoGES helps because biodiversity is biology, economics, and sociology. These issues can't be solved by just one school."

- Chris Funk

- Chris and 14 colleagues from around the world launched the "Coalition for Conservation Genomics" to build capacity and improve incorporation of genetics into international biodiversity conservation policy. This launch was described and publicized in a paper published this year in Conservation Science and Practice.
- Chris collaborated with colleagues on the book Conservation and the Genomics of Populations. The first run was published in May 2022 by Oxford University Press, three years after the five-person team commenced work on this monumental project.



STUDENT SUSTAINABILITY CENTER

A University-wide, student-run organization that empowers students to advance sustainability practices and principles on and beyond CSU's campus.

Students at the SSC's annual plant potting event. Photo courtesy of the SSC.

SSC members run a Patchwork Initiative clothing repair table at the Earth Day fair. Image courtesy of the SSC.

The Student Sustainability Center (SSC) 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.

In the fall, the SSC bid a warm farewell to Associate Director of Engagement **Molly Wharton**, and welcomed **Reaghan Fields** to the team this summer as the new Engagement and Logistics Officer. **Sam Moccia** continued his term as Director of the SSC.

Over the course of the 2021-2022 academic year, the SSC's presence on campus and in the community grew significantly as students returned to campus, and CSU resumed in-person events. The SSC supported students during move-in with recycling support, advocating for clean energy, and collaborating with other students groups to clean up campus.

2021-2022 Highlights:

- Hosted 9 club meetings, 6 Coalition of Sustainable Student Organization meetings, and 2 speaking events.
- Hosted 5 educational clothing repair workshops with **The Patchwork Initiative**, a collaborative campus project.
- SSC Instagram followers increased to 1035, and email subscribers increased by over 150.
- Started the Graduate Student Chapter of the Student Sustainability Center.
- Connected with numerous local sustainability advocacy organizations and supported student outreach for the 2021 Earth Day Fort Collins event.
- SSC Graduate Student Chapter members helped organize and attended the Climate Leadership Summit, a sustainability focused event for Poudre School District high school students.
- Hosted a lunchtime event at the Climate Leadership Summit to chat with graduating high school students about research and sustainability efforts at CSU and beyond.

SSC Graduate Student Chapter

This year, the SSC expanded to encompass the graduate student population at CSU for the first time, with the formation of the Graduate Student Chapter of the Student Sustainability Center.

The SSC Graduate Student Chapter is led by Jacob VanderRoest, a first-year graduate student from the Chemistry Department. Jacob plans to lead this organization during the 2022-2023 academic year and is excited to see it grow and develop further.

The Graduate Student Chapter is distinct because their members conduct specific research and scholarship and can discuss projects they've devoted multiple years to. Their goal

The first SSC Graduate Student Chapter meeting

is to engage with the greater Fort Collins community and inform others of their work and how it might impact them.

The SSC Graduate Student Chapter seeks to bring together environmentally focused graduate students from disparate disciplines to network and attend seminars focusing on

"I see the chapter serving as an educational resource, and representatives of the larger CSU grad student population."

- Jacob VanderRoest

different facets of sustainability. These seminars featured presentations by CSU professors from the departments of Engineering, Political Science, English, and Environmental and Radiological Health Sciences.

The Patchwork Initiative

Students mend their own clothes at a repair workshop with help from The Patchwork Initiative volunteers. Photo courtesy of the SSC.

It's never been easier to produce, order, use, and dispose of clothing. And with dwindling access to home economics-style classes in schools and communities, fewer and fewer people are familiar with clothing repair and textile upcycling.

The Patchwork Initiative, a student-led clothing sustainability collaborative, was created with the goals of reducing clothing consumption and growing a culture of clothing restoration. The project was built on foundations laid by former SSC director, Sara VanHatten, and Design and Merchandising associate professor Sonali Diddi. It is now run by the SoGES Student Sustainability Center (SSC), the Department of Design and Merchandising (DM) and the Avenir Museum of Design and Merchandising at CSU, with grant support from the President's Sustainability Commission.

Over the course of the 2022 spring semester, The Patchwork Initiative (TPI) has grown rapidly, now boasting a core team of seven primarily DM students and close partnerships with CSU's Department of DM and the Avenir. Together, they have run six mending workshops with more than 100 cumulative hours of clothing repair education.

TPI was at CSU's Earth Week fair with sewing machines in hand, and organized this year's community mending workshop at the annual Earth Day Fort Collins, where the team made their first purely community-facing appearance. These events gave TPI a chance to test what works, and it officially begins in Fall 2022. Plans include continuing apparel repair workshops, expanding social events and increasing educational opportunities for students and the community.

THE AFRICA CENTER | africacenter.colostate.edu

Leading change for sustainable African ecosystems and societies

The Africa Center is led by Dr. Kathleen Galvin, Professor of Anthropology, and is composed of CSU faculty, students, community members, and African partners addressing issues of sustainability of environments and societies across the African continent. The Center's mission is to foster environmental, economic, and social sustainability in Africa through teaching, research, and engagement. The Center's Executive Committee of seven makes recommendations and provides guidance to the Center. Ongoing activities include Global Symposia featuring leaders from Africa, talks by CSU and non-CSU scholars, panel discussions, networking discussions, and an end-of-year Africa and Ale event.

2021-2022 HIGHLIGHTS:

- Hosted a virtual guest lecture: "The Architecture of Care: Student Engagement with Rural Women Artists in Central parts of South Africa" – February 2022
- Invited guest lecturer – Gerhard Bosman from the Earth Unit in the Department of Architecture, University of the Free State, South Africa
    - Moderated by Kathy Galvin
    - 50+ people attended
- Hosted a virtual panel discussion: "Conservation through and African Lens" – April 2022
    - Panelists included Aaniyah Omardien (South Africa), Lucy Waruingi (Kenya) and Zilanie Gondwe (Malawi) – all from the Women for Environment in Africa (WE Africa)
    - Moderated by Kathy Galvin
    - 40+ people attended
- Hosted an in-person guest lecture: "Kenya Wildlife Trust: Building Collaboration and Inclusivity for Conservation" – April 2022
    - Invited guest lecturer – Irene Amoke, Executive Director for the Kenya Wildlife Trust and Eisenhower Fellow
- Hosted our annual "Africa and Ale" end of year gathering in collaboration with the Gregory Allicar Museum of Arts in person – April 2022
    - Over 130 people attended
    - Raised $900 in donations for the center

- **Fundraising** We embarked on a $25,000 scholarship fundraiser to fund CSU students who are passionate about Africa and support the creation of 5-7 paid fellowships for students to work with CSU faculty to address sustainability challenges in African ecosystems and societies.
    - We have so far raised $11,000
- **Field Notes** Field Notes is a platform (https://africacenter.colostate.edu/blog-field-notes/) 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 we produced podcasts or blogs focused on the following:
    - Monica Lasky – Masters student in Ecology
    - Dr Jessie Luna – Assistant Professor in Sociology
    - Martha Beirut – PhD student in Human Dimensions of Natural Resources
    - Dr Brett Bruyere – Associate Professor in the Warner College of Natural Resources

GLOBAL SOIL BIODIVERSITY INITIATIVE | globalsoilbiodiversity.org

An ongoing worldwide effort to support soil biodiversity research and advocate for its inclusion in education, policy development, and land management for the benefit of people and ecosystems.

Pseudoscorpions (Microbisium brevifemoratum) are one example of the many diverse soil organisms on Earth. Photo: Andy Murray

LEADERSHIP

Diana H. Wall (Scientific Chair), School of Global Environmental Sustainability and Department of Biology

Monica A. Farfan (Executive Director), School of Global Environmental Sustainability

It is estimated that more than 25% of biodiversity inhabits soil, but the contribution of soil organisms to all life on Earth has been largely ignored. The Global Soil Biodiversity Initiative (GSBI) leads and advances soil biodiversity science by supporting new ideas, international connections, and the mainstreaming of knowledge of soil life and ecosystem services for sustainable development.

The GSBI is 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 completely 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 responds to environmental change. Members include those investigating taxonomy, soil health, ecosystem services, biogeochemistry, and anthropogenic causes of loss of soil habitat and biodiversity, as well as those developing education and communication programs for all ages. The GSBI actively pursues the cross-engagement of policy and scientific communities to build capacity across the wide range of biodiversity science and to assure the Convention on Biological Diversity and other international policies include soil biodiversity as needing protection and an integral key to future soil sustainability.

2021-2022 Highlights:

- Partnership with international agencies and governing bodies such as the UN CBD, UN-FAO and the European Commission
- Partnership with and participation in research, innovation, education programs, such as SoilBON, a global Biodiversity Observation Network, that build equity and capacity in soil biodiversity science
- Served as the central global forum to provide opportunities for the multidisciplinary biodiversity community to share and accelerate knowledge on advancements and solutions in biodiversity research and related sciences
- Worked to translate and insert current knowledge on soil biodiversity in global reports
- Enabled cross-collaboration by supporting online data-sharing opportunities and increasing accessibility to benefit soil biodiversity community network
- Developed knowledge to conserve and protect soils and soil biodiversity

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

Website
76,923
page views on sustainability.colostate.edu (27% international traffic)

News & Media
265
media mentions (76% domestic, 24% international) with total readership of ~**85 million**

Social Media
4,332 Email Subscribers
2,002 Facebook Followers
2,993 Twitter Followers

EVENTS

All events in 2021-2022 were held either in-person or virtually due to the COVID-19 pandemic.

Oct. 27 **The Moral Field of Environmental Engineers in Late Twentieth-Century United States**. Speaker: **Ryan Hearty**, Johns Hopkins University

Jan. 27 **Perspectives on COP 26, Climate Change and the Future** Moderator: **Cody Sanford**, CSU Alum, B.S. Ecosystem Science and Sustainability Panelists: **Kaydee Barker**, Undergraduate Student, Dept. of Ecosystem Science and Sustainability; **Jacob Genuise**, Graduate Student, Dept. of Ecosystem Science and Sustainability; **Matthew Twyman**, Graduate Student, Dept. of Ecosystem Science and Sustainability

Mar. 7 **Creating Sustainable Futures: Adventures in Story-based Scenario Design** Speaker: **Dr. Pat Keys**

Mar. 10 **Economics for a Fragile Planet**. Speaker: **Dr. Edward Barbier**, Colorado State University

Managing the Planet Panel Series

Each panel features CSU experts who field live questions from community members and students, and is moderated by **Gene Kelly**, SoGES Faculty Research Liaison, and Associate Dean of Extension.

Feb. 9 **What's biodiversity got to do with it? Nature-based solutions to the climate crisis**. Panelists: **Chris Funk**, Dept. of Biology; **Yoichiro Kanno**, Dept. of Fish, Wildlife, and Conservation Biology; **Kristen Ruegg**, Dept. of Biology; **Andrew Seidl**, Dept. of Agriculture and Resource Economics

Mar. 9 **Water: The Critical Nexus in Colorado's Future**. Panelists: **Mazdak Arabi**, Dept. of Civil and Environmental Engineering; **Jill Baron**, Senior Research Scientist & Scholar, Natural Resource Ecology Laboratory; **Chris Goemans**, Dept. of Agricultural and Resource Economics; **Ellen Wohl**, Dept. of Geosciences

Antarctic Lecture Series

Antarctic researchers describe various aspects of life, work, and conducting science "on the ice."

Sept. 21 **An apex predator in a changing climate; What we are learning from leopard seals**. Speaker: **Shane Kanatous**, Department of Biology, Colorado State University

Oct. 19 **Slippery when wet: Exploring the hydrosphere beneath the Antarctic ice sheet**. Speaker: **Dr. Matthew R. Siegfried**, Department of Geophysics, Colorado School of Mines

Nov. 16 **Life Under Ice: Diving into Antarctic microbial landscape**. Speaker: **Dr. Tyler Mackey**, Department of Earth and Planetary Science, University of New Mexico

Mar. 22 **Collecting climate data in Antarctica while addressing its carbon footprint**. Speaker: **Krista Myers**, Lead Technician, Louisiana State University

Apr. 19 **Using Narrative to Develop Environmental Empathy.** Speaker: **Diane McKnight**, Professor, Department of Civil, Environmental and Architectural Engineering University of Colorado Boulder

Symposia and Special Events

Apr. 5 **Climate Intervention to Cool a Warming Planet** Moderator: **Peter Backlund**, Associate Director, School of Global Environmental Sustainability. Panelists: **Jim Hurrell**, Professor and Scott Presidential Chair in Environmental Science and Engineering, Department of Atmospheric Science; **Ken Shockley**, Professor and Holmes Rolston III Chair in Environmental Ethics and Philosophy, Department of Philosophy

Apr. 15 **Climate Leadership Summit** *(see page 15)* Speakers: **Scott Denning**, CSU Atmospheric Sciences, **Sheryl Magzamen**, CSU Assistant Professor, Environmental and Radiological Health Sciences, **Sonali Diddi**, CSU Associate Professor, Dept. of Design and Merchandising, **Dan Welsh**, Air Quality Meteorologist, Colorado Department of Public Health and Environment, **Terrence Iverson**, CSU Associate Professor, Department of Economics, **Jim Hurrell**, CSU Scott Presidential Chair of Environmental Science and Engineering, **Pat Keys**, CSU Lead Scientist, School of Global Environmental Sustainability, **Stephanie Malin**, CSU Associate Professor of Sociology & Co-Director of the Center for Environmental Justice, **Gillian Bowser**, CSU Associate Professor **Dimitris Stevis**, CSU Professor, Department of Political Science and Center for Environmental Justice

Apr. 27-30 **Climate Change Workshop for Fulbright Scholars** Co-Sponsored with The Office of International Programs. Speakers included **Gillian Bowser,** CSU Associate Professor, Department of Ecosystem Science & Sustainability, **Becky Bollinger**, Climatologist, Colorado Sate University and State of Colorado, **Olga Wilhelmi,** National Center for Atmospheric Research, **Thomas Bradley,** CSU Professor, Department Head of Systems Engineering, **Dannele Peck,** United States Department of Agriculture, **Camille Stevens-Rumann,** CSU Assistant Professor, Department of Forest and Rangeland Stewardship, **Ben Livneh**, CU Boulder Associate Professor, Department of Civil, Environmental and Architectural Engineering, **Alex Hager** Reporter, KUNC, **Peter Backlund**, Associate Director, School of Global Environmental Sustainability,

Jun. 6-7 **Climate Transitions Dialogue** *(see page 6)* **DAY 1** Speakers: **Jeff Muhs**, CSU Energy Institute, **Martin Carcasson**, CSU Center for Public Deliberation. **Peter Backlund**, CSU School of Global Environmental Sustainability. Panelists: **Russ Schumacher**, CSU & Colorado State Climatologist, Lisa Dilling, University of Colorado - Boulder, Professor of Environmental Studies. **Caroline Havrilla**, CSU Climate Adaptation Partnership. **Brad Udall**, CSU Water Center, **Camille Stevens-Rumann**, CSU Department of Forest & Rangeland Stewardship, **Gene Kelly**, CSU Agricultural Experiment Station. **Bryan Willson**, Executive Director, CSU Energy Institute. **Ned Harvey**, CEO, Digital Gaia, **Jane Zelikova**, Executive Director, CSU Soil Carbon Solutions Center, **Ed Barbier**, University Distinguished Professor, CSU Department of Economics. **Josie Plaut**, CSU Institute for the Built Environment. **Joe von Fischer**, CSU Biology, **Honoré Depew**, City of Fort Collins Climate Program Manager, **Victor Galvan**, Strategic Partnership Manager, Conservation Colorado

DAY 2 Speakers: **Mirielle Gonzalez**, CSU Climate Adaptation Partnership. Panelists: **Winna MacLaren**, Denver Climate Action, Sustainability, and Resilience, **Stephanie Malin**, CSU Center for Environmental Justice, **Daniel Dean**, CSU Department of Epidemiology & Radiological Health Sciences, **Beth Lunsford**, CSU Department of Epidemiology & Radiological Health Sciences. **Bill Ritter, Jr.**, Director, CSU Center for the New Energy Economy. **Jim Lochhead**, CEO, Denver Water, **Alice Jackson**, Senior Vice President, System Strategy and Chief Planning Officer, Xcel Energy, **Duane Highley**, CEO, Tri-State Generation & Transmission Association. **Alan Rudolph**, Vice President for Research, Colorado State University

In 2021-22 SoGES held 17 events which reached over 1,000 people

The Africa Center Panel Discussion

Nov. 3 **Mapping COVID in Urban Africa: Is it Helping?** Moderator: **Melinda Laituri**, Emeritus Professor, Department of Ecosystem Science and Sustainability, Colorado State University. Panelists: **Bianca Gerente** Manager, (Assistant teacher) Director of the Faculty of Tourism Management and Informatics; Pemba, Mozambique; **Erica Hagen** Director, GroundTruth Initiative; Nairobi, Kenya; **Mulongaibalu Mbalassa** Professor at the Faculty of Sciences, Department of Biology; Bukavu, Democratic Republic of the Congo; **Gaston Mbonglou** Africa Hub Lead, U.S. and Africa Sourcing and Growth Advisors

Center for Environmental Justice

Nov. 9 **Social Environmental Rights in Colombia: Insights from Black and Indigenous Leaders** Moderator: **Marcela Velasco**, Department of Political Science, Colorado State University. Panelists: **Andrea Castillo**, Black Community Council, Bajo Mira y Frontera; **Aquileo Yagarí**, Ex-governor, Indigenous Council, Karmata Rúa, Antioquia; **Danny Ruiz**, Ainí Women's Association, Naya River; **Daniel Grueso**, Black Community Council, Mayorquín River; **Efraín Jaramillo**, Jenzerá Work Collective; **Enni Marselli Salazar Hurtado**, Black Community Council, Lower Saija River; **Fernando Castrillón**, Semillas Group and Jenzerá Work Collective; **José Santos Caicedo**, Black Communities Process Proceso de Comunidades Negras; **Norbey Quiroz**, Indigenous Council, Dagua; **Miguel Ángel Ortiz**, Youth Leader, Pacific Vision Organization, Organización Visión Pacífico.

LEADERSHIP

Diana H. Wall, Director

Diana Wall is a CSU University Distinguished Professor, Professor of Biology, and Director of the School of Global Environmental Sustainability (SoGES). Since the founding of SoGES in 2008, Diana has been a driving force for connecting CSU faculty, researchers, and students to address the world's greatest sustainability challenges. An ecologist, she is recognized for her work on soil biodiversity and climate change impacts in the Antarctic dry valleys. Wall Valley, Antarctica was designated for her contributions. Diana was president, Society of Nematologists and the Ecological Society of America. She received the 2013 Tyler Prize for Environmental Achievement, the Ulysses Medal, University College Dublin, the 2019 President's Medal of the British Ecological Society and is an elected member of the National Academy of Sciences. She earned her Ph.D. at the University of Kentucky.

Peter Backlund, Associate Director

Peter Backlund 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 U.S. 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 U.S. 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

Kathleen Galvin is a CSU University Distinguished Professor, Professor of Anthropology and Director of The Africa Center at CSU. She is also an Advising Faculty member for the Graduate Degree Program in Ecology. She has conducted interdisciplinary social-ecological systems research in the drylands of Africa. Galvin has worked with local communities on issues of land use change, biodiversity conservation, food security, and climate change impacts and adaptations. She works with local communities, ecologists, modelers, remote sensing, and GIS experts to understand human-environmental interactions. Professor Galvin is co-author of the American Anthropological Association Task Force Report on Global Climate Change. She is the 2017 award recipient of the CSU John N. Stern Distinguished Professor Award and received the 2017 award for Resident Distinguished Ecologist from the Graduate Degree Program in Ecology at CSU. She is a lead author on the 2019 Global Assessment on the United Nations Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. She received a BA and MA from Colorado State University and a PhD from Binghamton University, NY.

Eugene Kelly, Faculty Research Liaison

Eugene Kelly is a Professor of Pedology and Deputy Director of the Colorado Agricultural Experiment Station at Colorado State University. He conducts research and lectures on various aspects of soils as related to global change issues. 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 member of the U.S. National Committee for Soil Science with the National Academy of Sciences. He serves as an advisor to the U.S. Department of Agriculture with the National Cooperative Soil Survey, National Institute of Food and Agriculture, the National Science Foundation and several major research programs. He is a Fellow of the Soil Science Society of America and the recipient of the 2016 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.

FACULTY

Dale Lockwood, Academic Coordinator; Assistant Professor Department of Biology and SoGES

Susan Melzer, Assistant Professor Department of Soil and Crop Sciences and SoGES

STAFF

Jarvis Choury
Fiscal and Operations Manager

Darren Cockrell
Research Proposal Coordinator

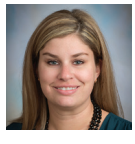
Ryan Deming
Website Content Specialist

Monica Farfan
Executive Director, Global Soil Biodiversity Initiative

Nate Harper
Communications Specialist

Sam Moccia
Director, Student Sustainability Center

Matt Norton
Fiscal Assistant Manager



Laura Shaver
Program and Events Manager

Jacob VanderRoest
Director, Student Sustainability Center Grad Chapter

Aleta Rudeen Weller
Senior Research and Engagement Officer

Robert Jackson, Chair, External Advisory Board

Rob Jackson is a Professor in Earth System Science in the Stanford Doerr School of Sustainability at Stanford University. He and his lab examine the ways people affect the Earth, such as in forest ecosystems and by measuring and reducing greenhouse emissions through the Global Carbon Project, which Rob chairs. Rob is a current Guggenheim Fellow, a Fellow in the American Association for the Advancement of Science, American Geophysical Union and Ecological Society of America. An author and photographer, Rob published a trade book on the environment (The Earth remains forever, Univ. Texas Press), and two books of children's poems.

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

EXTERNAL ADVISORY BOARD

Robert Jackson (Chair), Professor in Earth System Science, Stanford Doerr School of Sustainability, Stanford University
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William Brennan, President, Resilient Infrastructure Group
Thomas Dietz, University Distinguished Professor, Environmental Science and Policy, Sociology and Animal Studies, Michigan State University
Maggie L. Fox, Founder, MaggieFoxStrategies, LLC
Thomas Lovejoy, University Professor, Department of Environmental Science and Policy, George Mason University
Jonathan Patz, Director, Global Health Institute, University of Wisconsin-Madison
Bill Ritter, Jr., Former Colorado Governor, Director, Center for the New Energy Economy, Colorado State University
Osvaldo Sala, 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

SENIOR SCHOLARS

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

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
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Mary-Ann Kokoska	Art and Art History
Erika Osborne	Art and Art History
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Emily Fischer	Atmospheric Science
Sonia Kreidenweis	Atmospheric Science
Kristen Rasmussen	Atmospheric Science
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Chris Funk	Biology
Cameron Ghalambor	Biology
Alan Knapp	Biology
Graham Peers	Biology
LeRoy Poff	Biology
Melinda Smith	Biology
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Ravi Ravishankara	Chemistry
Aditi Bhaskar	Civil and Environmental Engineering
Jens Blotevogel	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
Peter Backlund	SoGES
Diana Wall	SoGES & Biology
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

FINANCE REPORT

Description	Budget	Expenses	Credits
FY 2021-22 Base Budget	$1,113,920.00		
Salaries			
Director, Associate Directors		$468,576.00	
Staff		$459,366.00	
Student Hourlies		$5,825.00	
SALARIES TOTAL		**$933,767.00**	
Program Activities			
Research			
Global Challenges Research Teams and Resident Fellows		$60,000.00	
Sustainability Curriculum Innovation Grants		$54,000.00	
Total		**$114,000.00**	
Sustainability Leadership Fellows program			
Science Communication Workshop, Trainings, and Year Operations and Supplies		$31,832.00	
Total		$31,832.00	
Education			
GES Traditional and Online Courses (Professors, GTAs, Supplies)		$159,304.00	
Total		**$159,304.00**	
Student Sustainability Center			
Salaries		$3,570.00	
Operations and Events		$2,107.00	
Total		**$5,677.00**	
PROGRAM ACTIVITIES TOTAL		**$310,813.00**	
General Administration			
Supplies		$14,035.00	
Operating Charges (Events, Phone, Data, Etc.)		$49,028.00	
Travel		$9,056.00	
Total		**$72,119.00**	
EXPENSE TOTAL		**$1,316,699.00**	
Miscellaneous Income			
1X Monies			$60,000.00
1X Monies from President's Office and President's Sustainability Commission			$52,000.00
Differential Tuition			$29,672.00
FY20 Carryforward			$88,208.00
Online Courses Revenue			$54,784.00
Salary Savings From Grants			$4,925.00
Balance for Future Commitments in FY23			**$86,810.00**

SoGES continued to implement research projects during 2020-2021 that are supported by grants and cooperative agreements awarded in previous fiscal years by NASA, NSF, USDA, and The Gordon and Betty Moore Foundation.

PUBLICATIONS

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