

GES

GEOGRAPHY & ENVIRONMENTAL SCIENCES

2020-2021 NEWSLETTER



Department of Geography
& Environmental Sciences

COLLEGE OF LIBERAL ARTS AND SCIENCES

UNIVERSITY OF COLORADO **DENVER**

CHAIR'S NOTES



Greetings GES alumni, supporters and friends! I hope that you are all safe, well, and thriving. As many of you know, we performed nearly all our research, teaching, and service activities remotely over the last year and a half due to the COVID pandemic and have successfully transitioned back to in-person operations this autumn. Despite all the challenges of time, we will continue the department's strong trajectory of growth and development.

During the previous academic year, 47 undergraduate students completed a BA in Geography and an additional 2 completed degrees in Environmental Science. Our graduate programs similarly continued in strength with 16 Master of Arts degrees in Applied Geography and Geospatial Science and 10 Master of Science degrees in Environmental Science. Congratulations to our graduates! Completing a university degree during an international pandemic requires an additional measure of mettle and stamina. I hope you will all join our thriving alumni community and I look forward to seeing the great things you will all achieve as you embark upon your careers.

Congratulations are also in order for Dr. Rafael Moreno, who successfully completed his promotion to Full Professor this year!

GES welcomes a new leadership team this year. In the Fall, Rafael Moreno will begin a three-year term as Director of Graduate Programs and Kris Christensen will assume the role of Undergraduate Director. Rafael and Kris have some big shoes to fill. Our gratitude goes to Gregory Simon for his service as Director of Graduate Studies and to Frederick Chambers for his work as Undergraduate Director. They oversaw significant growth, change, and challenge during their three-year terms. Drawing from our experiences over the previous five or so years, we have just completed some changes to the requirements of the MSES program, which were formally approved by the university in the Spring. We are excited about these changes, part of our continuing efforts to improve the learning experiences of our students.

We congratulate Rudi Hartmann for his retirement; starting this year, he will now assume the position of Clinical Professor Emeritus. Rudi served as an instructor in the department for 28 years, starting

in 1993. He has taught a broad range of courses for the department that includes Introduction to Human Geography, Geography of Tourism, Globalization and Regional Development, Geography of China, Geography of Europe, and other regional geography courses. Rudi will continue to teach one or two courses per semester as he works on research projects.

With some sadness, we must also report the passing of GES instructor, Jeanne Mayne, who passed away at the age of 94. Jeanne was the only remaining member of the department since its foundation in 1973. In recent years, she frequently taught Geography of the Middle East and Geography of South America.

We also grieve the loss of GES undergraduate James Crocker, who completed his degree in the Spring. James was an undergraduate student who studied urban geography. He had a wide range of interests spanning travel, music, and was known as a kind and supportive student and peer.

I would like to conclude this by recognizing the resilience of the GES community. Few could have anticipated the challenges of the pandemic; since it began in March 2020, students, faculty, and staff have demonstrated impressive resilience and adaptability as we all had to change the way we perform our work and interact in fundamental ways. While many of us underwent enormous personal and professional challenges, I believe that we emerge as strong as ever, poised for continued growth.

With sincere regards,

PETER ANTHAMATTEN

Associate Professor | Department Chair

FACULTY NEWS

Measuring the Variable Composition and Chemistry of a Volcanic Plume Using a Distributed Sensor Network



Ben Crawford was awarded a grant from the National Science Foundation to continue measurements of volcanic air pollution on the Big Island of Hawaii using next-generation sensor networks. This project aims to further develop distributed low-cost sensor networks as tools for air quality research and monitoring. Specifically, he will use next-generation sensors to track the chemical evolution of 'vog' (volcanic smog) from Kīlauea volcano on the Big Island of Hawaii. This is important to improve air pollution forecasts

and characterize exposures for the >450 million people who live near active volcanoes worldwide. Findings from this study also have potential to be adapted for other situations, including smoke from severe wildfires.



Volcanic ash plume from Kīlauea volcano on the Big Island of Hawaii

Dr. Crawford was also awarded a CU Denver Creative Research Collaborative grant with colleagues in the College of Engineering and School of Education to develop educational activities based on low-cost air quality sensors. Additionally, Dr. Crawford and Dr. Matt Cross received funding (JST & CU Denver) as part of a Japan-U.S. collaboration to study the impact of 'cool roofs' on extreme urban heat.



Kathy Kelsey received a \$20,000 grant from CU Denver Office of Research Services (ORS) for a proposal titled: *Colder growing conditions in a warmer world? Effects of altered snowpack properties on alpine plant growth.*

Dr. Kelsey also received funding from the National Science Foundation for a project titled: *Collaborative Research: Climate-*

induced sea-level rise, warming and herbivory effects on vegetation and greenhouse gas emission in coastal western Alaska. This project, a collaborative effort with scientists from Utah State University and South Dakota State University, will investigate the effects of



The study site, the Yukon-Kuskokwim Delta, taken from a float plane

climate change in the vast coastal tundra ecosystem of western Alaska which is experiencing warming temperatures, increased flooding from sea-level rise, and changes to the numbers and locations of geese who migrate to Alaska in the summer and graze local vegetation. This research asks how these changes will affect vegetation communities and natural uptake and release of greenhouse gases by this ecosystem. The project will also collaborate with a local teacher to create place-based middle school science curriculum for use in local schools, and bring local students to the field.



Gregory Simon used the pandemic year to collaborate and publish with CU Denver students and colleagues. He also used the year to jumpstart some new projects! He published two papers with students who had previously traveled with him to India. These publications examine both challenges and opportunities for integrating perspectives from local communities into development projects in rural India.

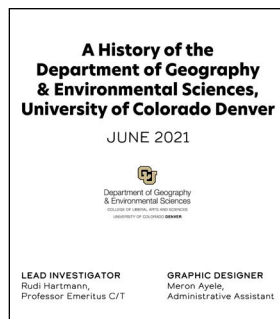
Finally, Dr. Simon began work on two exciting new research projects. The first project explores how digital platform-based food systems such as GrubHub and DoorDash are changing food production, transportation and consumption in Denver. A second project examines the history, science and politics of “The Big One” earthquake along the U.S. west coast. This project describes various ways the “The Big One” reverberates through society well before the seismic shock occurs. Dr. Simon presented research at the 2021 American Association of Geographers Conference and the 2021 Royal Geographical Society Conference.



Kris Christensen earned her certificate in Effective College Instruction from the Association of College and University Educators (ACUE) and the American Council on Education.

“Faculty credentialed by ACUE have demonstrated comprehensive knowledge and skills across all of the core teaching competencies defined in ACUE’s effective practice framework.”

Learn more: acue.org/programs/certificates



Rudi Hartmann and **Meron Ayele** updated the GES History document to reflect the events of the COVID-19 pandemic. They compiled e-mails, photos, and other materials from March 2020 forward to create two new sections: *Pandemic Year 2020-2021* (CU Denver’s response to the outbreak and closures) and *GES During the Pandemic Year* (the GES department’s recollection of these events).

GES History is a project initiated by Dr. Rudi Hartmann in 2018. The document details significant events in the life of the department—from the founding of the university to the hiring of the most recent faculty member. Read it here:

clas.ucdenver.edu/ges/sites/default/files/attached-files/ges_history_2021.pdf

The Geospatial Analysis and Mapping Laboratory (GAMLab) will soon offer mapping services through contracts and grants to faculty and researchers, as well as to external organizations. Services will include map production, informational graphics, data compilation, geospatial analysis, digitizing, consulting, and more. These projects will allow our talented students to put their geospatial skills to

use by collaborating with a variety of groups seeking geospatial products and services. We also have a new website where you can find our contact information and learn more about the GAMLab:

clas.ucdenver.edu/gamlab.



PUBLICATIONS

Anne Chin, Gregory Simon, Peter Anthamatten, Kathy Kelsey, Ben Crawford, and Amanda Weaver jointly published a paper titled: *Pandemics and the future of human-landscape interactions*. This paper suggests the need for a dramatic shift in human-environment research that better accounts for infectious diseases and other health concerns that emerge from human land use decisions.

Abstract

Pandemics have accelerated in frequency in recent decades, with COVID-19 the latest to join the list. Emerging in late 2019 in Wuhan, China, the virus has spread quickly through the world, affecting billions of people through quarantine, and at the same time claiming more than 800,000 lives worldwide. While early reflections from the academic community have tended to target the microbiology, medicine, and animal science communities, this article articulates a viewpoint from a perspective of human interactions with Earth systems. We highlight the link between rising pandemics and accelerating global human impacts on Earth, thereby suggesting that pandemics may be an emerging element of the “Anthropocene.”

GES Faculty Publications

Anthamatten, P. (2021). *How to Make Maps: An Introduction to the Theory and Practice of Cartography*. Routledge.

Bacon, C.B., **Kelley, L.C.**, Stewart-Frey, I. In Press. (2021). Toward a Feminist Political Ecology of household food and water security during drought in Nicaragua. *Ecology and Society*.

Bacon, C.B., Sundstrom, W.A., Stewart-Frey, I., Maurer, E., **Kelley, L.C.** (2021). Towards smallholder food and water security: Climate variability in the context of multiple livelihood hazards. *World Development*, 14:105468.

Ballantyne, A.P., Liu, Zhihua, Anderegg, W. R. L., Yu, Z., Stoy, P., Poulter, B. Vanderwall, J., Watts, J., **Kelsey, K. C.**, Neff, J. C. (2021). Reconciling carbon-cycle processes from ecosystem to global scales. *Frontiers in Ecology and the Environment*, 19(1): 57-65.

Biermann, C., **Kelley, L.C.**, Lave, R. (2020). Putting the Anthropocene into practice: Methodological implications. *Annals of the American Association of Geographers*, 111(3): 808-818.

Chin, A., O'Dowd, A.P., Mendez, P., Velasco, K., Florsheim, J.L., Laurencio, L.R., Leventhal, R. (2021). Toward natural approaches in restoration: Experiments of co-evolving physical and biological structures in a self-organizing step-pool channel. *River Research and Applications*.

Chin, A., Simon, G.L., Anthamatten, P., Kelsey, K.C., Crawford, B.R., Weaver, A.J. (2020). Pandemics and the future of human-landscape interactions. *Anthropocene*, 31:100256.

Chin, A., Cui, X., Gillson, L., Nelson, D., Taylor, M.P., Vanacker, V., Wang, E., (2020). Anthropocene in an age of pandemics. *Anthropocene*, 30:100247.

Chin, A., Gregory, K.J., O'Dowd, A.P. (2020). Urbanizing river channels. In: Shroder JF (Editor in Chief), Wohl E (Volume Ed.) *Treatise on Geomorphology, Fluvial Geomorphology*.

Choi, R.T., Beard, K.H., **Kelsey, K.C.**, Leffler, A.J., Schmutz, J.A., Welker, J. M. (2020). Early goose arrival increases soil nitrogen availability more than an advancing spring in coastal western Alaska. *Ecosystems*.

Crawford, B., Hagan, D.H., Grossman, I., Cole, E., Holland, L., Heald, C.L., & Kroll, J.H. (2021). Mapping pollution exposure and chemistry during an extreme air quality event (the 2018 Kīlauea eruption) using a low-cost sensor network. *Proceedings of the National Academy of Sciences*, 118(27).

Eriksen, C., Simon, G.L., Roth, F., Lakhina, S., Wisner, B., Adler, C., Thomalla, F., Scolobig, A., Brady, K., Brundl, M., Neisser, F., Grenfell, N., Maduz, L., Prior, T. (2020). Rethinking the Interplay Between Vulnerability and Affluence to Aid Climate Change Adaptive Capacity. *Climatic Change*, 162:1, 25-39

Florsheim, J.L., **Chin, A.** (2021). Geomorphic responses to wildfire in fluvial systems, 2021. In: Shroder JF (Editor in Chief); Harden, C.P., James, L.A., Claque, J. (Volume Eds.) *Treatise on Geomorphology, Geomorphology of Human Disturbances, Climate Change, and Hazards*.

Hartmann, R. In Press. (2021). Holocaust Tourism. In Jafari, J, and Xiao, H. (Eds.), *Encyclopedia of Tourism* (2nd ed.). Springer.

Hartmann, R. In Press. (2021). Landmark Tourism. In Jafari, J, and Xiao, H. (Eds.), *Encyclopedia of Tourism* (2nd ed.). Springer.

*Huvard, H., Talbot, R., *Mason, H., *Thompson, N.A., Ferrara, M., **Wee, B.** (2020). Science identity and metacognitive development in undergraduate mentor teachers. *International Journal of STEM Education*, 7(31): 1-17.

Kelley, L.C., Shattuck, A., Thomas, K. In Press. (2021). Cumulative socio-natural displacements: Reconceptualizing climate displacements in a world already on the move. *Annals of the American Association of Geographers*.

Kelley, L.C. (2020). Explaining the limitations of agricultural intensification initiatives in Sulawesi, Indonesia. *Frontiers in Sustainable Food Systems*, 4: 1-18.

Kelley, L.C. (2020). A Critical Physical Geography of landscape change in Southeast Sulawesi, Indonesia, 1950s-2005. In: Walsh, S.J., Riveros-Iregui, D., Arce-Nazario, J., and Page, P.H. (eds). *Land Use/Land Cover Change on Islands: Social and Ecological Threats to Sustainability*. Springer.

Kelsey, K.C., Pedersen, S.H., Leffler, A.J., Sexton, J.O., Feng, M., Welker J.M. (2021). Winter snow and spring temperature have differential effects on vegetation phenology and productivity across Arctic plant communities. *Global Change Biology*, 27(8):1572-1586.

Krayenhoff, E.S., Jiang, T., Christen, A., Martilli, A., Oke, T.R., Bailey, B.N., Nazarian, N., Voogt, J.A., Giometto, M.G., Stastny, A. and **Crawford, B.R.** (2020). A multi-layer urban canopy meteorological model with trees (BEP-Tree): Street tree impacts on pedestrian-level climate. *Urban Climate*, 32, 100590.

Pain, K., Shi, S., Black, D., Blower, J., Grimmond, S., Hunt, A., Milcheva, S., **Crawford, B.**, Dale, N., Doolin, S., Manna, S. (2020). Real estate investment and urban density: exploring the polycentric urban region using a topological lens. *Territory, Politics, Governance*, 1-20.

Simon, G., Peterson, C., *Anderson, E., *Berve, B., *Caturia, M., *Rivera, I.* (2021). Multiple Temporalities of Household Labour and the Challenge of Assessing Women's Empowerment. *Development and Change* 52:2, pp. 289-315

Simon, G., **Wee, B.** Chatti, D., *Anderson, E. (2020). Drawing on knowledge: Visual narrative analysis for critical environment and development research. *Environment and Planning E: Nature and Space*, 4, 1-25.

*Steger, A., *Evans, E., **Wee, B.** (2021). Emotional cartography as a window into children's wellbeing: Visualizing the felt geographies of place. *Emotion, Space and Society*, 39, 1-10.

Wee, B. (2020). The nature of childhood in childhood nature. In A. Cutter-Mackenzie, K. Malone, E. Barratt Hacking (Eds.), *Research Handbook on Childhood Nature*, pp. 1025-1042. Springer International Handbooks of Education.

*CU Denver Graduate Students and Alumni

2020-2021 COLLOQUIUM SERIES

5 Forces, 5 Trends, & 5 Skills in Geotechnologies and Why They Matter

Dr. Joseph Kerski | September 4th, 2020

Geoawareness, geoenablement, geotechnologies, citizen science, and storytelling are combining to bring the GIS community to a pivotal moment. How can these forces, along with 5 trends in GIS, transform how our world moves through this new decade? What 5 skills do you most need to chart your own course forward? Geographer Joseph Kerski delivered a fun and lively presentation as we reflected on the progress the community has made and the challenges that remain through 5 forces, 5 trends, and 5 skills.

Joseph Kerski is a geographer with a focus on the use of Geographic Information Systems (GIS) in education. Joseph was the President of the National Council for Geographic Education and gave a TED Talk on “The Whys of Where”. He holds 3 degrees in geography and has served as geographer in 4 sectors of society, including government (21 years at NOAA, US Census Bureau, USGS), academia (Penn State, Sinte Gleska University, University of Denver, others), private industry (as Education Manager for Esri), and nonprofit organizations (with roles as President of the National Council for Geographic Education, and others).



The Missing Lynx: Restoration, research, and ongoing work to conserve Canada Lynx in Colorado

Dr. Jake Ivan | October 2nd, 2020

Canada lynx were extirpated from Colorado by the mid-20th century. Beginning in 1999, the Colorado Division of Wildlife (now Colorado Parks and Wildlife) started a decade-long reintroduction program to restore this predator to the southern portion of its range. Learn the details of how the reintroduction effort unfolded, what we learned along the way, recent research and monitoring results, and what the prognosis for lynx might be moving forward.



Jake Ivan is a Senior Scientist in the Mammals Research Section of Colorado Parks and Wildlife in Fort Collins, Colorado. He earned an M.S. in Wildlife Biology from the University of Montana, and a Ph.D. in Fish, Wildlife, and Conservation Biology from Colorado State University. His current research interests include impacts of bark beetle outbreaks on lynx, snowshoe hares and other wildlife, impacts of timber harvests and large-scale monitoring of rare and elusive species. He has published numerous articles in Ecology, Ecosphere, Ecology and Evolution, Ecography, Environmetrics, Journal of Wildlife Management and Applied Geography.

Teaching, Learning, & Coping in the Age of COVID-19

Marley Harwood (MS), Maggie Praley (MS), Nick Russell (MA), Mandy Rees (MA 2020, Lecturer)
October 16th, 2020

COVID-19 has dramatically shifted the ways by which we teach and learn in formal as well as informal settings. Educators everywhere, from college instructors and K-12 teachers, to parents and childcare providers, have had to cope with novel challenges.

Graduate students and faculty in GES presented from a range of roles and perspectives to address the following questions: What are the 'lessons learned' from your teaching, learning and coping experiences? How might these insights help us move forward as a community, and as a department? What do these COVID-related changes imply for the future of education in general?



Marley Harwood



Maggie Praley



Nick Russell



Mandy Rees

Wild and Native Trout: Conservation, Restoration, and the Molecular Turn

Dr. Christine Biermann | November 6th, 2020

Through the use of new genetic technologies, questions about what counts as biodiversity conservation are being radically reimagined. In our research, my colleague Dr. David Havlick and I explore how the “molecular turn” is revolutionizing native and wild trout conservation across the American West. Trout management routinely defies both geography and biology, moving fish between watersheds, and mixing and hybridizing species. Recently, scientists have begun sifting through trout genetics to rectify decades of genetic disruption and understand the heritage of particular trout. As these issues of lineage and purity come to the forefront of management decisions, genetic science is increasingly called upon to help decide the fate of fish across entire water bodies or watersheds, compelling managers to care for or kill trout populations in the interest of preserving unique evolutionary lineages and promoting native trout.



Christine Biermann is an Assistant Professor of Geography and Environmental Studies at University of Colorado Colorado Springs. Her research interests include critical physical geography, the politics and science of biodiversity conservation, and the socioecological dynamics of forests. She is also the Director of the UCCS Tree Ring Lab, where she works alongside students to analyze forest change using dendrochronology.

Secondary Cities: Geospatial data-driven decision making

Dr. Melinda Laituri | December 4th, 2020



The geography of place is informed by social relations, cultural connections, and the built environment. In this presentation, Dr. Laituri presented the Secondary Cities that build local capacity in using open source geospatial technologies to collect data needed for urban planning and integrated resource management, strengthen local capacity through international partnerships, and creates new data for secondary cities that are data-poor, under-resourced, and lack basic infrastructure and essential services. Mapping these cities is an essential activity in building resiliency and devising robust emergency management plans.

Vegetation dynamics following wildfire in Guadalupe Mountains National Park

Dr. John Sakulich | February 5th, 2021

Wildfire is an important natural disturbance agent in conifer forests of the southwestern United States. Historic patterns of fire occurrence were highly altered beginning in the late 19th century when Euro-American settlers excluded fire through livestock grazing and fire suppression. The absence of fire from these fire-adapted forests has increased tree density and fuel accumulation. As a result of increased fuel loads, wildfire severity has increased causing widespread tree mortality and shifts in forest structure and composition. In May 2016, a wildfire burned through a network of permanent forest monitoring plots in Guadalupe Mountains National Park. This natural experiment presents a rare opportunity to examine fire effects from a wildfire where the pre-fire forest conditions are known.



John Sakulich is an associate professor of biology and director of the environmental studies program at Regis University in Denver, Colorado. He earned an M.S. in Geography from Penn State and a Ph.D. in Geography from the University of Tennessee. His research focuses on what forests have looked like in the past and how they have changed over time. Much of his work uses dendrochronology (the analysis of annual growth rings in trees) to understand the effects of climate, land use, and disturbance on patterns of forest vegetation. His recent research has focused on the response of southwestern forests to fire, and the effects of climate change on alpine treeline.

Continuous Improvement Programs, Public Health, Protection, and Water Resources Management: the vital role of applied GIScience and Technology

Dr. Todd F Brewer | March 5th, 2021

Turning data into information. This discussion provided a brief overview of the American Water Works Association (AWWA) and the continuous improvement/optimization programs available to support public health protection, through the provision of safe drinking water, across the United States - and internationally, too. Advances in the ability to reliably provide safe drinking water are recognized by

the Center for Disease Control as one (actually two) of “10 Great Achievements in Public Health in the Twentieth Century”. Effective, and ever improving, water treatment processes would not be possible without purposeful and sustained water resources management – environmental stewardship from source to tap... and back again. The introduction to AWWA’s optimization programs, general public health protection aspects of drinking water treatment, and water resources management issues of concern will serve as a precursor to a more detailed discussion on the vital (and growing) role of Geographical Information Sciences and Technology in support of ALL of these efforts.



Todd Brewer is currently the Senior Manager – Grants, Education, and Utility Programs with AWWA in Denver, CO. Prior to AWWA, he gained 22+ years of experience in the drinking water field as a water quality analyst, manager, researcher, and licensed Water Operator. He has instructed many Operator Certification classes and AWWA workshops over that time. He is a licensed Professional Engineer, holds a PhD in Environmental Engineering, and has taught chemistry and engineering courses at the college-level for the last 25+ years.

Why emotions matter: Making a case for the qualitative in geospatial research and practice

Elly Evans, MA , Andrew Steger, MA | May 7th, 2021

Geographic Information Systems (GIS) can illuminate important spatial relationships, and it has allowed us to gain a deeper understanding of the places we inhabit. Traditional GIS practices, however, often focus on objective, quantifiable data. In doing so, they render invisible the feelings and other ‘messy’ human experiences that are central to people place relationships. Our research highlights the need to embrace emotions in geography and GIS. We do this through an exploration of children’s well-being using qualitative GIS, such as emotional cartography, to elicit situated knowledges, preferences and the felt geographies of place. Specifically, we use emotion maps to generate memories of childhood place attachments, and to nurture spatial empathy in our work. Join us as we share our findings and the excitement of doing research as graduate students in GES!



Elly Evans graduated from CU Denver in Spring 2021 with a Master of Arts in Applied Geography & Geospatial Science. Her research interests include digital geographies, nature & wilderness, critical & qualitative GIS, and science & technology studies. She recently finished a thesis examining how digital representations of nature on Instagram inform how we understand and value the outdoors.



Andrew Steger graduated from CU Denver in Summer 2020, also with an MA in Applied Geography and Geospatial Science. His research interests broadly include GIS, human-environment interactions, and children’s geographies. Specifically, as a research assistant with CU Denver and Project Voice, he helped use visual methodologies to document and express youth concerns about Denver’s changing landscapes.

THESIS DEFENSES



New-Build Gentrification in the American Urban Core: the Case of Denver's Lower Downtown Neighborhood

Mallory Prentiss, MA | April 5th, 2021

Abstract

New-build construction is causing an expansion in the presence of gentrification and displacement in urban neighborhoods across the United States. The dominant explanation for this trend is urban renewal. Previous research has focused on neighborhood transitions in economic class make-up as the primary indication that gentrification is occurring in a community. These studies have investigated major cities across the world, using a broad characterization of the process of gentrification. I use a narrowed definition of the process to identify change caused by a specific kind of gentrification involving new construction projects. Using a combination of GIS and archival methodologies, I examine the historic Lower Downtown (LoDo) neighborhood in Denver, Colorado to explore how the history and development of the area have been and continue to be affected by new-build gentrification. My findings indicate that LoDo's new-build projects have, over time, enabled entrance of not only a standard form of gentrification into the neighborhood, but also the expansion of a luxury market. This creates a heightened level of social polarization amongst lower- and upper-class individuals, signifying that lower-income community members are being excluded from new housing and retail projects and displaced by increasing cost of living.



Experiencing Nature on Instagram: A New Space for Outdoor Participation

Elly Evans, MA | April 13th, 2021

Abstract

Our perceptions of nature are deeply informed by the images of outdoor landscapes and recreation we see on a daily basis. Once produced and promulgated via dominant print and television media gatekeepers, contemporary representations of nature for public consumption are increasingly developed and shared by individuals through social photography smartphone apps such as Instagram. Though these technologies are often situated in opposition to nature, images of the outdoors now pervade our social media feeds as we collectively participate in the construction of new and diverse digital nature spaces online. This research examines the experiential contours of Instagram, asking critical questions about the peculiar way the platform structures and mediates our consumption and perceptions of nature, and ultimately our relationship with nature in the material world. I suggest that

Instagram simultaneously challenges some long-held ideas about nature while reinforcing others. On one hand, Instagram's architecture creates a public space to create and make visible diverse representations of nature, in turn generating spaces for novel solidarities, particularly along lines of gender, race and outdoor ability. On the other hand, the platform segregates these representations into thematic hashtags, often rendering them invisible to the broader base of Instagram users, thereby thwarting the integration of diverse opinions and experiences.



Left Behind in Lockdown: COVID-19 and the Denver Unhoused Community
Lucy Briggs, BA | April 16th, 2021

Abstract

The population experiencing homelessness in Denver, Colorado increased by nearly 15% from 2018 to 2019. This trend, combined with the SARS-CoV-2 pandemic of 2020, led to a distinct crisis for unhoused communities. This research attempted to answer the question, "How has COVID-19 impacted the locational strategies and spatial patterns of the Denver unhoused population in relation to public resources and spaces in the city core?" More specifically, this research has three objectives: (1) To develop an understanding of COVID-19's impact upon public spaces and resources in Denver, (2) to explore the impact of COVID-19 on the shelter availability in Denver, and (3) to conduct a spatial analysis of the "sweeps", or the displacement of unhoused individuals' outdoor tent encampments. Through a literature review, interviews, and spatial analysis, this research shows that fewer resources were available to unhoused individuals due to COVID-19, and displacement of encampments disconnected individuals from vital resources.

Understanding the link between refugees and water in Irbid Refugee Camp, Jordan
Rachel Tarbet, MA | April 16th, 2021

Abstract

At the end of the 1948 Arab-Israeli War some 70,000 Palestinian refugees fleeing the conflict entered Jordan. Among them included 4,000 refugees who, in 1951, would settle in a 0.24 kilometer (0.15 mile) area in Irbid. Irbid, a small town which had mainly consisted of a trade and agriculture economy, has become one of the most densely populated areas in all of Jordan. With the massive population influxes have brought severe water resource management issues to a boiling point. Using historical research and GIS data, I examine the relationship between refugees and water resource management in an arid to semi-arid place. I have found that population increases and density are directly related to drought and therefore water scarcity, and that the presence of refugees directly benefits the Jordanian government through international aid and resource management projects. However, the dominant narrative of refugees causing resource management issues and environmental degradation cannot be proven and instead the blame must be laid upon government entities and the international agencies that oversee refugee populations.



Green Value Gaps and Permissible Sustainability: LEED Buildings and Environmental Gentrification in Denver

Nick Russell, MA | June 23rd, 2021

Abstract

The economic and environmental benefits of urban sustainability projects are emphasized while their social implications are often ignored. Urban sustainability projects that are unilaterally represented as beneficial for all can have detrimental social consequences. Environmental gentrification is one of these potential consequences, whereby low-income residents are displaced or excluded from areas with new green amenities. Existing environmental gentrification research focuses on large-scale and conspicuous forms of urban sustainability (such as green space and transit-oriented developments). Little is known about the role green buildings play in the environmental gentrification process. This research begins to fill this knowledge gap by examining the relationship between Leadership in Energy and Environment Design (LEED) certified buildings and gentrification in Denver between 2010 and 2018. I assess how the presence of LEED-certified buildings throughout Denver is related to seven socio-demographic and economic gentrification indicators using a novel weighted regression method. The impacts of individual LEED-certified buildings on local property values were also evaluated to identify whether proximity to LEED-certified buildings is associated with gentrification. LEED-certified buildings in Denver were found to be associated with gentrification in a spatially varied manner. This work also reveals how LEED-certified buildings take advantage of “green value gaps”, whereby green certification is commodified away from ideals of ecological protection toward consumer marketing and capital accumulation. Thus, urban sustainability through LEED-certification becomes depoliticized and removed from any meaningful social or ecological critique of current urban development practices. I suggest that LEED-certified buildings in Denver represent a form of “permissible sustainability” on the neoliberal urban landscape as they do not challenge status quo economic processes that may contribute to environmental degradation. Instead, they allow, and promote, the continuation of accumulation-centered urban development and gentrification.



Mapping Seven Urban Tree Species Using a WorldView-3 Multispectral Satellite Image Across the Denver Metropolitan Landscape

Samuel Blake, MA | July 7th, 2021

Abstract

Urban forests support several ecological services, including biological functionality and habitat connectivity. For municipalities, the spatial mapping of trees allows for precise management and planning of the urban landscape. Moreover, urban forests provide essential floral resources, including nectar and pollen, to pollinators in areas where vegetation may be sparse. Thus, there is the need to provide

current and accurate tree species maps. Traditional tree inventories are collected via ground-based acquisitions, requiring time, personnel, and funding to complete. Remote sensing, however, is an alternative approach to collect urban tree information due to its spatial, spectral, radiometric, and temporal capabilities. This thesis investigates the identification and spectral discrimination of seven pollinator-friendly urban tree species in three foraging regions of the Denver Metropolitan Area with honeybee hives. Specifically, *Acer saccharinum*, *Catalpa speciosa*, *Celtis occidentalis*, *Gleditsia triacanthos*, *Malus sylvestris*, *Tilia americana*, and *Tilia cordata* are the species considered. This study compares performance accuracies of two supervised object-based classification approaches on a WorldView-3 multispectral image with a 1.24m spatial resolution. The first method, known as the supervised approach, classified trees based on the multispectral image. Second, a modified approach classified trees using the multispectral image in addition to a LiDAR-derived digital surface model. The results indicate overall accuracies of the two approaches are comparable, as the supervised and the modified methods achieved moderate accuracies of 76.11% and 77.85%, respectively. Additionally, *Acer saccharinum* was found to have the highest coverage by area in the three foraging ranges. The results of this research suggest a small number of trees important to pollinators can be mapped using current high-resolution remote sensing data.



Power Shutoffs within Fire-Prone Areas: Examining Household Impacts and Adaptations in Sonoma County

Alix Bakke, MA | July 9th, 2021

Abstract

Our modern infrastructure relies on a constant supply of energy. Disruption of this resource can result in economic loss, lack of access to basic utilities, degradation of communication, and limited access to emergency supplies.

Unfortunately, the United States aging electric infrastructure has ignited large, deadly wildfires within the west, prompting utility companies to implement pre-emptive de-energization or Public Safety Power Shutoffs (PSPS). During 2019, California experienced the extent of PSPS when an estimate of 2.5 million customers had their power turned off. Because PSPS will continue to occur in the foreseeable future, it is important to further our understanding of this emerging phenomenon. This research examines how PSPS have impacted households and assesses how households may be adapting for future shutoffs by conducting an online survey within Sonoma County. Results from the survey indicate that PSPS have produced cascading impacts within fire-prone areas. At the same time, households have already begun adapting to PSPS, suggesting greater resilience to future power shutoffs.



Stakeholder Engagement and Monitoring & Evaluation (M&E) in Adaptive Management (AM): A Critical Review of the Spruce Beetle Epidemic Aspen Decline Management Response (SBEADMR) in Western Colorado

Jordan Truitt (BA, 2020) presented his undergraduate honors thesis findings at both the annual meeting of the Association of American Geographers (AAG) and at the International Association of Landscape Ecology North American meeting. His thesis was developed under the supervision of Dr. Rafael Moreno-Sanchez, M.S. Clay Speas from U.S. Forest Service, and Dr. Peter Anthamatten. Jordan performed a critical review of the stakeholder engagement and Monitoring & Evaluation (M&E) processes within the project *Adaptive Management (AM) of the Spruce Beetle Epidemic Aspen Decline Management Response (SBEADMR)* in western Colorado. AM is based on learning by doing to reduce uncertainty, and adjusting future management practices based on what is learned. AM is increasingly used in the area of natural resources management. The stages of stakeholder engagement and M&E are critical for creating a successful AM. Also, they are common sources of failure in many AM projects. Jordan's research aimed to provide insights for the SBEADMR and for AM practitioners overall. Despite some challenges found in the application of the AM approach, the thesis findings indicate that the SBEADMR is following many of the AM best practices mentioned in the environmental management literature. This has resulted in good stakeholder engagement, cost savings, and several types of efficiencies in the process of managing the forests in western Colorado.

Thesis defenses and other virtual presentations are available on the GES YouTube channel
youtube.com/channel/UCNWmuGzNyxA790EoVjd55eQ

STUDENT ACHIEVEMENTS

Six graduate students served on the Graduate Student Executive Committee

Alix Bakke, MA · Elizabeth DeRycke, MA · Sarah Hase, MS · Maggie Praley, MS

Will Sjulstad, MA · Stephanie Valencia-Gaeta, MS

The Graduate Student Executive Committee acts as a liaison between the graduate student body and the GES department. They relay concerns, interests, and suggestions of our graduate students while also planning community activities, events, and social gatherings.

Rodgers Undergraduate Scholarship Recipients

General Scholarship (Fall)

Melissa Allen
Jordan Truitt

Research Scholarship (Spring)

Lucy Briggs

Several graduate students and faculty presented their research poster at the virtual American Association of Geographers (AAG) Conference

Title: Integrating Environmental Education Opportunities at an Urban Farm: An Application of Systems Theory--Service-Learning Curriculum

Authors: Jeffrey Matteson, Marley Harwood, Stephanie Valencia-Gaeta, Brenna Challis, Matthew Cohen, Nicole Dellana, Maggie Gillard, Kyle LeMaire, Michelle Martin, Mallory Prentiss, Amanda Weaver, Bryan Wee, Gregory Simon, Anne Chin

Abstract

The multi-faceted nature of environmental challenges necessitates not only interdisciplinary research but also meaningful education. A Systems Theory-Service Learning (STSL) model encourages this holistic integration. With its emphasis on nonlinear processes and feedback loops, systems theory addresses a breadth of environmental issues, while immersion in the field through service learning deepens knowledge and skills. In the spring of 2021, ten research projects were conducted by 30 graduate students at a local urban farm as part of the MS and MA curriculum in Geography & Environmental Sciences at the University of Colorado Denver. These projects addressed topics of carbon storage, microclimatology, solar energy resources, river channels, rotational grazing, and others, all of which included outreach and education elements. This study seeks to demonstrate a) the breadth and depth of each project's content within an STSL model, and b) the importance of diverse educational approaches to better understand complex human-environmental interactions. Data from project proposals, written assignments, and student surveys were collected, analyzed, and compiled to produce a conceptual diagram that illustrates multiple interactions among environmental topics and educational approaches in an STSL model. In doing so, we draw attention to the ways by which an STSL model can nurture interdisciplinary research and education, as well as the benefits of field-based learning experiences for students.



2020-2021 Graduates

Bachelor of Arts in Geography

Juan Aguilar-Estrada	Shannon Hourigan	Gabrielle Sigar
David Bennett	Mikhail Kaminer	Austin Silva
Jerald Berry	Madeline LaPolla	Eric Snyder
Lucy Briggs	Blake Levine	Noah Stuvell
Paola De La Torre Macias	Adrian Lopez	Emily Szczechowski
Rebecca Dennis	Awbrey Moffett	Jaime Trudeau
Rachel Faciane	Randall Munib	Jordan Truitt
Logan Field	Brandon Najdovski	Jett Turner
Davis Fyffe	Taylor Newlun	Dayne Ultsch
Wesley Garcia	Breiana Olguin	Leila Vaucher
Derek Gonzales	Abner Ramos Salcedo	Gabrielle Wenger
Lyndsie Griesse	Krystin Rios	Bryce Wilkerson
Noah Hammer	Benjamin Robinson	Gavey Zheng
Rikke Harris	Jonah Rutherford	Eve Zook

Master of Arts in Applied Geography and Geospatial Science

Clayton Adams-Berger	Mallory Prentiss
Alix Bakke	Alex Romansky
Samuel Blake	Nicholas Russell
Elizabeth DeRycke	Hannah Shook
Elly Evans	Sarah Studebaker
Zachary Johnson	Rachel Tarbet
Michelle Martin	Erika Wright

Master of Science in Environmental Sciences

Vanessa Cantu
Millicent Chandler
Matthew Cohen
Kristina Guariello
Angelina Kocher

Kyle LeMaire
Jeffrey Matteson
Allison Philpott
Aaron Walker
Peter Zerbe

Geographic Information Science (GIS) Certificate

Satya Akquia
Melissa Allen
Ellie Berg
Samuel Blake
Lucy Briggs
Vanessa Cantu
Paola De La Torre Macias
Rebecca Dennis
Elizabeth DeRycke
Chad Ellertson
Elly Evans
Rachel Faciane
Logan Field
Wesley Garcia
Amy Gillaspie
Kevin Hovick
Zach Johnson
Mikhail Kaminer

Aubre Martin
Awbrey Moffett
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Breiana Olguin
Mallory Prentiss
Abner Ramos Salcedo
Alex Romansky
Gabrielle Sigar
Nicholas Russell
Sarah Studebaker
Noah Stuvell
Rachel Tarbet
Rebeca Thornburg
Jett Turner
Davin Wilkinson
Erika Wright

**CONGRATULATIONS TO ALL
OF OUR 2020-2021 GRADUATES!**



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