

ANNUAL ECOSYMIOSIUM
IT STARTS AT THE TOP:
THE INTERTWINED
FATES OF WATER AND
ECOSYSTEMS IN THE
CLIMATE CRISIS

September 23, 2023
9 am - 3 pm

BOULDER COUNTY NATURE ASSOCIATION
CENTER FOR SUSTAINABLE LANDSCAPES AND
COMMUNITIES
Sustainability, Energy and Environment Complex (SEEC)
University of Colorado Boulder, 4001 Discovery Drive, Boulder



8:30 - 9:00 COFFEE, NAME TAGS, REGISTRATION

9:00-9:15 INTRO AND OVERVIEW OF DAY
SANDRA LAURSEN & CLAUDIA VANWIE

9:20 LIZ PAYTON: "AN OVERVIEW OF CLIMATE CHANGE'S COMPLEX EFFECTS
ON THE WATER CYCLE"

Human-caused climate change is intensifying the water cycle across the globe. Averages and extremes are changing as the physical processes that govern the water cycle respond to the warming atmosphere. Extreme weather events are increasing, and combined hazards, like drought followed by wildfire followed by debris flows, are altering the landscape. Water cycle changes differ across regions and seasons and have a variety of impacts on social and ecological systems. We will review what we know about recent and future changes relevant to Colorado and the Front Range, how we know it, and what we don't know but need to better understand.

Liz Payton, Western Water Assessment, Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado Boulder, is a water resources

specialist with Western Water Assessment, a NOAA-funded applied research group hosted at CIRES on the CU campus. She is the Water Chapter Lead for the Fifth National Climate Assessment, a congressionally mandated, quadrennial report about climate trends and projections and their impacts on the US. She is co-editor and co-author of the synthesis report, Colorado River Basin Climate and Hydrology: State of the Science, released in 2020. Before coming to WWA, Liz worked as a water resources engineer at Hydrosphere Resource Consultants in Boulder, where she worked on several river basin and municipal system water supply modeling projects across the West. Liz has volunteered on community working groups and boards including the City of Boulder Planning Board, and served in the US Peace Corps as a volunteer math and science teacher in a remote village in western Nepal.

10:05 - 10:30 COFFEE BREAK

10:30 EVE-LYN HINCKLEY: “WATER IN A WARMING ALPINE: SURPRISES IN THE WATER QUALITY RECORD OF NIWOT RIDGE, COLORADO, AND BEYOND”

The deposition of strong acids or “acid rain” has decreased substantially over the past 30 years in the Colorado alpine region. The pH of precipitation has followed these declines and has increased to near pre-industrial values, consistent with trends across the continental U.S. These trends show the impacts of environmental air regulations and are the beginning of an environmental success story. Yet, despite declining atmospheric sulfur deposition, there are surprising increases in sulfur concentrations in Colorado mountain streams and alpine systems globally. Sulfur increases are likely driven by warming mountain climates, which may lead to acidification of streams and mobilization of heavy metals. However, we do not observe acidification, and the acidity of surface waters is declining over time. Overall, this high alpine watershed is trending towards pre-industrial conditions with respect to water quality, but many of the physical, chemical, and ecological phenomena within the warming alpine watershed require further research.

Eve-Lyn Hinckley, Cooperative Institute for Research in Environmental Sciences (CIRES) and Department of Ecology and Evolutionary Biology, University of Colorado Boulder, is an Associate Professor of Ecology and Evolutionary Biology and Fellow of the Cooperative Institute for Research in Environmental Sciences at the University of Colorado Boulder. Her research focuses on studying the elements that underlie all life on Earth, with an emphasis on how they are changed by human activities and how those changes feed back to affect human welfare. Eve earned her Ph.D. in Geological and Environmental Sciences from Stanford University and B.A. in Environmental Studies from Middlebury College. Her research is supported by multiple funding agencies, including the prestigious CAREER program through the U.S. National Science Foundation, the U.S. Department of Agriculture, and the National Geographic

Society. Eve has been recognized at the University of Colorado as a Research & Innovation Office Faculty Fellow and Arts & Sciences Support of Education Through Technology Teaching Fellow.

11:20 SARAH A. SPAULDING: “ALGAE IN THE FRONT RANGE AND BEYOND”

There are many types of algae, most of which are ecologically beneficial. Algae are photosynthetic, harnessing energy from the sun to support aquatic food webs. Algae are incredibly diverse, even absurdly diverse, organisms. However, there are many ways that some species of algae can “grow too much,” forming harmful “blooms.” She will provide an introduction to algae in our local area, including algal issues such as harmful algal blooms, commonly called HABs. The increased incidence of HABs is related to human sources of nutrients (nitrogen and phosphorus) to streams and lakes, increases in temperature, growing season, and concomitant changes in bottom sediments. She will provide an introduction to algae in streams and lakes across high to lower elevations of the Front Range.

***Sarah A. Spaulding**, US Geological Survey and INSTAAR, University of Colorado Boulder, works primarily involves diatoms, a type of single-celled algae. Diatoms are used as tools for understanding the history of lakes and oceans, as well as for assessing biotic condition of freshwaters. Her work is informed by diatom biogeography; where do species live and why do they live there? She strives to understand diatom biology and the ecological roles of diatoms on the planet. She is passionate about sharing all things diatomaceous with scientists, students, and the public. She currently serves as the Chair of the Editorial Review Board for collaborative, electronic, peer-reviewed flora, *Diatoms of North America* (diatoms.org).*

**12:05 - 1:15 LUNCH (YES, THERE IS SUCH A THING AS FREE LUNCH!)
TIME TO VISIT THE OUTREACH TABLES
DONATIONS ARE ALWAYS WELCOME**

**1:15 TIM SEASTEDT: “REWETTING THE SPONGE: MANAGING SOILS TO
CONTRIBUTE TO CLIMATE MITIGATION AND ENHANCING BIODIVERSITY”**

Attempts in Colorado to rewet upland soils to benefit threatened species began with a Nature Conservancy-sponsored effort in 2012 to enhance Gunnison sage grouse habitat. The work appears successful; activities are ongoing and the same strategies are being applied elsewhere. These upland restoration actions have now merged with riparian restoration efforts (e.g., plantings and beaver dam analogs) to demonstrate how “natural infrastructures” such as these can benefit both native biological diversity

and the productivity of treated habitats. These characteristics can mitigate local warming effects, and the actions also have potential benefits in reducing the severity of wildfires.

Tim Seastedt, *INSTAAR and Department of Ecology and Evolutionary Biology, University of Colorado Boulder, is Senior Fellow in the Institute of Arctic and Alpine Research and Professor Emeritus in the Department of Ecology and Evolutionary Biology at CU Boulder. He has studied grasslands for over 40 years and now is using his research findings and monitoring to understand community resilience and transformation with respect to climate change. He is particularly interested in the plant community feedbacks to climate, and how factors affecting biodiversity and productivity can mitigate local and regional climate effects. He has developed outreach programs and partnerships with Wildlands Restoration Volunteers to both advocate for and test ecological restoration techniques that benefit climate impacts.*

2:00 BRETT KENCAIRN: “NATURE-BASED SOLUTIONS: APPROACHING THE EARTH AS ALLY”

The existing paradigm of understanding climate change, with its attendant strategies, is clearly failing. The carbon-centric preoccupation of this failing paradigm has pointed to the foundational role that living systems play in either stabilizing climate or accelerating its rapid disintegration. A regenerative, nature-based climate strategy can be designed to solve the poly-crises of converging collapses: biodiversity collapse; the collapse of clean water, clean air, and clean food systems; the spiraling disequilibrium of climate extremes; and the impending displacement and migration of hundreds of millions of people. This latter condition—the rapidly growing relocation of humans—is the largely unrecognized greatest threat that climate change presents to the stability of human societies. There is a prospective solution—one that can be implemented rapidly to achieve significant improvements within a decade. This is the mobilization of a global regenerative works initiative that is centered locally but coordinated regionally, nationally, and internationally. It unites community-based land regeneration enterprises with applied research and innovation centers that can rapidly prototype, test, and perfect locally adapted land regeneration strategies. This is what we are initiating in Boulder.

Brett KenCairn, *Senior Manager, City of Boulder Nature-based Solutions, and Director, Center for Regenerative Solutions, serves as the city of Boulder’s Senior Policy Advisor for Climate Action and leads the City’s Natural Climate Solutions team. He is also the Director of the Center for Regenerative Solutions (CRS)—a national initiative to expand natural climate solutions nationally that is co-sponsored by the Urban Sustainability Directors Network. Brett’s primary responsibility is the ongoing evolution of the city’s climate action initiatives. Over the past two years, Brett has coordinated cross-department and multi-stakeholder efforts in soil regeneration and sequestration research on agricultural lands and an urban forestry expansion campaign at a local, regional, and national level. Prior to working for the city, Brett worked across the*

western US in community-based sustainable development, working in rural, Native American, and other communities in transition across the western US. He also is the founder or co-founder of four non-profits and two for-profits, including the Rogue River Institute for Ecology and Economy, Veterans Green Jobs, and Community Energy Systems.

2:50-3:00 THANKS, EVALUATION & CLOSING

Many thanks to the sponsors who made this ecosymposium possible: INSTAAR, CU Albert A. Bartlett Science Communication Center, CU Center for Sustainable Landscapes and Community, Boulder County Parks and Open Space, Boulder Open Space and Mountain Parks, Boulder County Audubon Society, The Watershed Center.