

## SNRI Research Symposium: Climate Action Research @ UC Merced: Lightning Talks Thursday, March 9 2023 10am-12pm

### Schedule

Note: individual talk times subject to change; check back for updates

Item	Time	Name	Position	PI Lab	Talk Title
Intro	10:00-10:07	Thomas Harmon, & Molly Stephens	, SNRI Director & Executive Director		Welcome
Talk #1	10:07	Louis Amegbletor	Graduate Student	Beutel	Modelling Effects of Climate Change, Wildfire and Forest Management on Water Quality in small catchments across the snow-rain transition in the Southern Sierra Nevada, California
Talk #2	10:13	Felber Arroyave	PhD (c), Environmental Systems	Jenkins	Research alignment in Yosemite and Sequoia - Kings Canyon National Parks.
Talk #3	10:19	Chris Bivins	Graduate Student	Frank	Interesting Drought Adaptations in Fungal Fruiting Bodies in the Sierra Nevada Foothills
Talk #4	10:25	Madeline Brown	PhD Candidate	Jenkins	Fluctuations in Attendance in Forested Pacific-West National Parks across varying Air Quality Conditions (working title)
Talk #5	10:31	Shelby Defeo	PhD Candidate	Beutel	Sediment release of nutrients and metals from two contrasting eutrophic California reservoirs under oxic, hypoxic and anoxic conditions
Talk #6	10:37	Humberto Flores-Landeros	PhD Student	Harmon	Using Biogeophysical Models to Connect Soil Carbon Dynamics with Irrigation Practices
Talk #7	10:43	Derek Hollenbeck	Ph.D. student, ME	Chen	Drones and Methane
Talk #8	10:49	Dr. Prakash Jha	Project Sci	Pathak	A methodology for assessing impact of climate change on nut crops considering physiological processes and by using global climate models
Break	10:55				
Break	11:00				
Talk #9	11:06	Dr. Jessica Malisch	Associate Director of the UC Merced Natural Reserve System	UCM NRS	¿field curious? Increasing Sense of Belonging in Field Research UC Merced Undergraduate Students
Talk #10	11:12	Zachary Malone	PhD Candidate	Ryals	Turning City Waste into Green Space; How to use Compost to Fight Climate Change in Cities
Talk #11	11:18	Naivy Dennise Rodal Morales	PhD candidate	Beutel	Effect of Organic Matter Loading on Methylmercury Production in Mildly Contaminated Wetland Soils
Talk #12	11:24	Jose Manuel Rodriguez Flores	Graduate Student	Medellin-Azuara & Harmon	Multi-benefit Land Repurposing in the San Joaquin Valley: Weighing Socio-Environmental Tradeoffs
Talk #13	11:30	Jorge Valero-Fandino	Ph.D candidate.	Medellin-Azuara	Climate change and groundwater regulation impacts on agriculture water availability
Talk #14	11:36	Kasem U. Salim	Graduate Student	Joyce	Environmental and Socioeconomic Factors Associated with the Risk of Dengue Fever Incidence in Guatemala
Talk #15	11:42	Jennifer Alvarez	Graduate student	Ghezzehei	Managing water to store soil carbon in irrigated systems
Talk #16	11:48	Bailey Carlson	Graduate Student	Dawson	Island biogeography of fish communities in young marine islands
Voting	11:54				
End	12:00				
	12pm-1pm	<b>Lunch/networking - SNRI Affiliates only (SNRI members and member's student/researcher lab affiliates)</b>			

### Abstracts

Alvarez, Jennifer. **Managing water to store soil carbon in irrigated systems.** The benefits of sustainable/conservation management practices on soil carbon dynamics has long been disputed due to numerous synergistic factors yielding different results. One factor that is still not understood sufficiently is soil water status impact on carbon mineralization. We measured soils water retention curve and respective soil mineralization rates simultaneously and observed management practices, particularly irrigation, can hindered soil carbon accumulation.

Amegbletor, Louis. **Modelling Effects of Climate Change, Wildfire and Forest Management on Water Quality in small catchments across the snow-rain transition in the Southern Sierra Nevada,**

**California.** The warming of temperatures due to climate change, the increase in the severity and intensity of wildfires, and the adoption of forest management techniques, plays a role in modifying water balance dynamics and sediment yield within watersheds. Quantifying the impacts of these natural and human perturbations on headwater watersheds is necessary to better manage water resources. This study will use hydrologic model WEPP, to understand the impact of climate change, forest management, and wildfire on water balance and sediment erosion within a headwater catchment in Sierra Nevada of California.

Arroyave, Felber. **Research alignment in Yosemite and Sequoia - Kings Canyon National Parks.** The National parks system is a dynamic system in physical, social, and political terms. Political changes since the 2000's have aimed at bridging science and management. Yet despite the paradigm shift instituting "science for parks, parks for science", there is scant research exploring the impact of science policy on research alignment (i.e., supply-demand) in national parks. We address this gap by leveraging the clearly delineated and well-ordered attributes of the US national parks to develop a spatiotemporal framework for evaluating knowledge alignment, here operationalized via quantifiable measures of supply and demand for scientific knowledge. More specifically, we apply a machine learning algorithm (Latent Dirichlet analysis) to a comprehensive park-specific text corpus (combining official needs statements and scientific research metadata) in order to define a joint topic space, which thereby facilitates quantifying the direction and degree of knowledge alignment. Results indicate an overall robust degree of knowledge alignment, with misaligned topics tending to be over-researched (as opposed to over-demanded), which may be favorable to many parks, but is inefficient from the park system perspective. Results further indicate that the transformative science policy exacerbated the over-supply of research in normative knowledge domains, manifesting in higher levels of misalignment.

Bivins, Chris. **Interesting Drought Adaptations in Fungal Fruiting Bodies in the Sierra Nevada Foothills.** The Sierra Nevada foothills are a hot, dry, and harsh environment for much of the year. Yet, biodiversity flourishes in this region, and fungi are no exception. A wide variety of distantly related fungi display unique as well as convergently evolved mechanisms for overcoming drought stress in their reproductive structure. This talk aims to introduce audience members to a handful of those adaptations.

Brown, Madeline. **Fluctuations in Attendance in Forested Pacific-West National Parks across varying Air Quality Conditions.** Across the continental United States, wildfires are increasing in duration and intensity, resulting in heightened particulate matter levels released into the atmosphere. Peak visitor-season attendance falls during peaks of harmful particulate levels due to alignment with heightened forest fire conditions. This study explores trends in visitation patterns to forested National Parks in the Pacific-West region, specifically California, Oregon, and Washington during periods of decreased air quality using PM2.5 as a proxy for overall air quality conditions. The research explores thresholds for visitation at National Parks of varying levels of visitation. Preliminary findings indicate that visitors are not dissuaded from visiting National Parks, despite negative health and experiential impacts.

Carlson, Bailey. **Island biogeography of fish communities in young marine islands.** Despite accumulating ~5 decades of information within island biogeography, studies highlighting young islands and the early stages of community assembly are sparse. We explored the structure of fish communities within the young island marine lakes of Palau using taxonomic, functional, and phylogenetic diversity. We found variation of diversity between communities—with some exhibiting stochastic or clustering of diversity measures—associated with the stratification of the habitat and certain environmental factors. Our results show how marine lake communities may have shifted over brief periods coupled with rapid environmental changes, possibly serving as a proxy for community assemblies of other young islands.

Defeo, Shelby. **Sediment release of nutrients and metals from two contrasting eutrophic California reservoirs under oxic, hypoxic and anoxic conditions.** Harmful algal blooms (HABs) and their associated toxins pose serious threats to California's water quality. This study examines the release of nutrients and metals from the sediment, known as internal nutrient loading, in Lake Henshaw and Lake Wohlford experimental chambers under various oxygen conditions and evaluates potentially favorable conditions for HABs. Lake Henshaw sediment release rates were higher than Lake Wohlford and other literature values. While the greatest release rates were generally seen under anoxic conditions, hypoxic

conditions may also be important for lake management given that hypoxic conditions resulted in a low N:P ratio, which can favor HABs, but may also have the potential to suppress HAB toxin production.

Flores-Landeros, Humberto. **Using Biogeophysical Models to Connect Soil Carbon Dynamics with Irrigation Practices.** Irrigation events are significant drivers in soil CO<sub>2</sub> efflux, but quantifying their spatiotemporal effects has been less trivial. Soil spatial heterogeneity and varying irrigation practices add further complexity when quantifying CO<sub>2</sub> efflux at larger scales. We utilize fields with spatially varying soil properties, along with the HYDRUYS 1D biogeophysical model to quantify the spatiotemporal effects of different irrigation practices on CO<sub>2</sub> efflux.

Hollenbeck, Derek. **Drones and Methane.** In this overview we will show our research activities of using drones for methane quantification in the past 9 years. From fugitive methane leak to permafrost peat bog emission as well as other anthropogenic sources like gas/oil industry, landfills, and dairy farms etc. A more detailed recent case study in Alaska APEX for ecosystem methane emission will be introduced at the end. Digital twin ideas for environmental monitoring will be shared.

Jh, Prakash, PhD. **A methodology for assessing impact of climate change on nut crops considering physiological processes and by using global climate models.** Given the long-term nature of the investment needed to establish new orchards of nut trees, an assessment of the impact of climate change on nuts production is critical to support stakeholders and growers. I would like to share a methodology, which I used for hazelnut (*Corylus avellana* L.) in the case of Australia, with the aim to extend similar methodology for California's nuts. I investigated the physiological response and the potential yield of hazelnut, using a process-based model. Model simulations assessed phenology, growth processes and yield in historical and future climatic conditions, using an ensemble of regional climate models with the boundary conditions from global climate models"

Malisch, Jessica, PhD. **¿field curious? Increasing Sense of Belonging in Field Research UC Merced Undergraduate Students.** ¿field curious? is an innovative, evidenced-based approach to enhancing workforce capacity and cultivating a diverse cohort of climate and conservation scientists to ensure adequate support for the state of California's climate goals. The primary barrier to students pursuing conservation and climate science degrees is a lack of sense of belonging in field research. The historic exclusion of marginalized groups, concerns about field safety, financial barriers, and lack of accessible mentors all contribute to student's difficulty seeing themselves in field-based careers. As such, ¿field curious? is an innovative intervention that addresses each of these barriers and is being implemented at UC Merced through our Natural Reserve System.

Malone, Zachary. **Turning City Waste into Green Space; How to use Compost to Fight Climate Change in Cities.** Cities landfill large amounts of organic material, contributing to climate change and environmental degradation. However, California senate bill 1383 seeks to change this by diverting 75% of organic materials from landfills (by 2025) and requiring cities to purchase compost for use. Compost will be made in high amounts to achieve the diversion goal and through meta-analysis and experimental study we show that this compost will not only help to increase the soil carbon and health of our urban soils, but will foster a circular economy and improve public health.

Rodal Morales, Naivy Dennise. **Effect of Organic Matter Loading on Methylmercury Production in Mildly Contaminated Wetland Soils.** The production and bioaccumulation of methylmercury (MeHg) in aquatic ecosystems is a global health concern. MeHg production is influenced by dissolved organic matter (DOM) with effects on mercury speciation and microbial activity. The study aimed to test the possibility of a sweet zone where the amount of DOM enhanced the most methylation potential. Results highlight the non-linear response of MeHg cycling under increasing DOM loadings with important implications for wetland management.

Manuel Rodriguez Flores, Jose. **Multi-benefit Land Repurposing in the San Joaquin Valley: Weighing Socio-Environmental Tradeoffs.** This presentation will provide an overview of the Tule Subbasin Multi-benefit Land Repurposing Project (MLRP) which is part of an inaugural California Department of Conservation project. We will describe the need for the project, the assembled team, and assessment

approach to characterize socio-environmental trade-offs between costs and benefits associated with land re-purposing including water use, agricultural revenues and wildlife conservation. The goal of this MLRP is to identify an effective, equitable, and transferable assessment framework that allows the engagement of the community and can support decisions statewide.

Salim, Kasem U. **Environmental and Socioeconomic Factors Associated with the Risk of Dengue Fever Incidence in Guatemala.** Dengue outbreaks in Guatemala have been occurring more often and at increased rates since the first dengue outbreak in Guatemala in the 1970s. This study examined environmental and socioeconomic factors associated with Dengue in Guatemala at the municipality (county) level. There was a positive relationship between minimum temperature and Dengue Fever incidence. Predicted rates of Dengue Fever also highlight the potential effect climate change in the form of increasing temperature can have on Dengue Fever incidence in Guatemala, as well as in other regions where Dengue is pervasive.

Valero-Fandino, Jorge. **Climate change and groundwater regulation impacts on agriculture water availability.** This research examines the compound effects of future climate and SGMA on water availability for agriculture in the southern region of California Central Valley. Some water management policies are proposed to deal with chronic groundwater depletion in the region.