AGENDA
2024 International CFEWS-100K CLIMA International Student Workshop

"Future Farming for the Net-Zero Emissions Goals"

Wednesday, May 8th | 8:30 am-12:00 pm Eastern Time U.S.

Thursday, May 9th | 8:30 am-12:00 pm Eastern Time U.S.

VIRTUAL MEETING

HTTPS://TENNESSEE.ZOOM.US/J/83334349368

EVENT WEBSITE

https://fewsus.utk.edu/2024-student-international-workshop/

THE UNIVERSITY OF TENNESSEE KNOXVILLE

Lead Organizer:
The University of Tennesee, Knoxville

Co-Organizing Institutions:
Technological University of Uruguay
Northeast Normal University, China

SPONSORS

About the CFEWS program: The United States National Science Foundation funded project **Climate-Smart Food-Energy-Water Nexus in Small Farms (CFEWS)** aims to develop innovative, integrated climate-smart food-energy-water nexus solutions based on the principles of circular bioeconomy.

The 100,000 Strong in the Americas Alliance for Climate Action (100K CLIMA) is a signature effort by the Bureau of Western Hemisphere Affairs at the U.S. Department of State (WHA-DOS) and Partners of the Americas (Partners) to catalyze climate action and collaboration at higher education institutions in the U.S. and Latin America and the Caribbean (LAC), equipping the region's future workforce with the skills needed to lead in a climate-positive, 21st century green economy. This green economy must be built on region-wide alliances between industry, governments, civil society, and education institutions working in alignment to prepare the workforce needed to simultaneously reduce emissions, inequality, and poverty. **100K Strong CLIMA Competition to Build Inclusive Climate-Action and Student Exchange Programs between the United States and Argentina, Chile, Paraguay, and Uruguay.** This regional 100K Strong competition is supported by the U.S. Department of State, Bureau of Western Hemisphere Affairs in collaboration with CAF: Development Bank of Latin America (CAF). Project: UTEC-UTK Academic Collaboration to promote Regional Energy Ecosystems.

WORKSHOP OBJECTIVES

The workshop aims to strengthen academic partnerships for developing sustainable farming systems that have robust resilience to global environmental change. Specific objectives are to:

- Share learning and research of food-energy-water nexus and evaluate their importance to agricultural and net-zero goals.
- Foster student collaborations across disciplines, culture, and socioeconomic systems and broaden their global visions.

OVERALL AGENDA

Day	U.S. Eastern Time	Scheduled Activity
May 8th	**8:30 am-12:00 pm**	**Opening Session & Presentations** Themes • Precision Agriculture • Soil Health
May 9th	**8:30 am-12:00pm**	**Presentations & Closing Session** Themes • Rural Development and Policies • Climate- Energy-Evironment Nexus • Water Resources

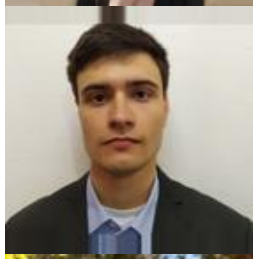
Day 1: Wednesday, May 8, 2024, 8:30 am - 12:00 pm (U.S. Eastern Time)	
8:30-8:40	**WELCOME & OPENING REMARKS** • **Welcome and Introduction of Workshop** Andres Mayorga, Chair (University of Tennessee & Zamorano Pan-American Agricultural School, Honduras).
8:40-8:45	**Global Academic Partnerships for Net-Zero transitions** Dr. John Stier, Associate Dean and Professor, Herbert College of Agriculture, University of Tennessee
8:45-12:00	**PRESENTATIONS** **Themes**: Precision Agriculture; Soil Health **Moderators:** Angela Price (University of Tennessee, USA) & Kevin Farias Romero (Technological University of Uruguay)
8:45-9:00	**Fine-Tuning N20 Emission Factors: A case study for a hairy vetch-maize sequence in Argentina.** Francisco Cafaro La Menza, National University of Mar del Plata, Argentina
9:00-9:15	**Study on fine risk assessment and early warning of maize high wind lodging disaster in Jilin Province.** Xiao Wei, Northeast Normal University, China
9:15-9:30	**Silo bag monitoring system.** Kevin Yeffrey Farias Romero, Technological University of Uruguay
9:30-9:45	**Utilizing remote sensing to estimate leaf biochemical parameters in advancing agriculture net-zero emissions goals.** Xiao Li, Northeast Normal University, China
9:45-10:00	**Nitrogen management practices to increase its use efficiency and minimize gaseous emissions in corn in the Argentine Pampas.** Maria Paula Iglesias, National University of Mar del Plata, Argentina
10:00-10:15	**How does the management of dual-use perennial grain systems affect soil health?** Berenice Montano Rodriguez, Zamorano Pan-American Agricultural School, Honduras
10:15-10:30	**Break (Student Network Video)** https://youtu.be/IySMsYKr8O4
10:30-10:45	**h-resolution soil organic mapping in eastern China: exploration of controlling factors through spatial analysis.** Xiao Tingting, Northeast Normal University, China
11:00-11:15	**A sensor monitoring system based on the Internet of things and its application to soil health.** Pamela Barboza, Technological University of Uruguay
11:15-11:30	**Taxonomic study of earthworms in northeast China and its functions in the environment.** Anne Charis Han, Northeast Normal University, Philippines
11:30-11:45	**The impact of grazing disturbance on the development of biocrusts and the microbial community.** Yue Li, Northeast Normal University, China
11:45-12:00	**Innovative Applications of Drones with Computer Vision and AI in Enclosed Agricultural Environments** Juan Manuel Deniz, Technological University of Uruguay

Day 2: Thursday, May 9, 2024, 8:30 am - 12:00 pm (U.S. Eastern Time)	
8:30-12:00	**PRESENTATIONS** **Themes**: Rural Development and Policies; Water Resources; Climate-Energy-Environment Nexus Anne Charis Han (Northeast Normal University, China); Michelle Boutelle (University of Tennessee, USA)
8:30-8:45	**Food-energy-water analysis of the bipartisan infrastructure law.** Angela Price, University of Tennessee, U.S.A.
8:45-9:00	**Perception of the impact of climate change and adaptation measures on the livelihoods of fishing communities in the municipality of Marcovia.** Andres Mayorga, Zamorano Pan-American Agricultural School, Honduras
9:00-9:15	**Equitable Scaling of Postharvest Technologies.** Michelle Boutelle, University of Tennessee, U.S.A.
9:15-9:30	**Sea-Garden Fortification Systems- The possibility of abio-dynamic future.** Kali Butler, University of Tennessee, U.S.A.
9:30-9:45	**Diagnosis of the presence of microplastics and agrotoxics in the leachate sedimentation water.** Romina Beloqui, Technological University of Uruguay
9:45-10:00	**Roles of phytohormone 6-benzylaminopurine (6-BA) to empower microalgae for high-salinity wastewater and bioresources.** Huiwen Yang, Northeast Normal University, China
10:00-10:15	**Break (FEWSUS conference video)** https://youtu.be/IySMsYKr8O4
10:15-10:30	**Electrochemical oxidation as treatment of cattle feedlot wastewater.** Dalila Cabañas, School of Agriculture, University of Buenos Aires, Argentina
10:30-10:45	**Constructed wetlands for wastewater treatment in urban areas.** Bailey Dills, University of Tennessee, U.S.A.
10:45-11:00	**The Acrocomia totai palm tree as a new crop for bioenergy and food in Argentina.** Diego Wassner, School of Agriculture, University of Buenos Aires, Argentina
11:00-11:15	**Oil Seed Crop for Aviation fuel: Ending the "Food Versus Fuel" Debate.** Sydney Logwood, University of Tennessee, U.S.A.
11:15-11:30	**RF heating using GaN technology for agriculture.** Jose Santiago Marrero Coitiño, Technological University of Uruguay
11:30-11:45	**Time-lag and accumulation effects of extreme precipitation on global vegetation dynamics since the 21st century.** Liu Min, Northeast Normal University, China
11:45-12:00	**Closing Remarks: "**The Role of Higher Education in Advancing the Sustainable Development Goals" Rachel Rui (Director, for Global Research, Innovation, and Partnerships, Center for Global Engagement, University of Tennessee)

WORKSHOP CHAIRS

ANDRES MAYORGA, Zamorano Pan-American University.
HONDURAS

ANGELA PRICE, University of Tennessee.
UNITED STATES OF AMERICA



KEVIN FARIAS ROMERO, Technological University,
URUGUAY

MICHELLE BOUTELLE, University of Tennessee
UNITED STATES OF AMERICA

ANNE CHARIS HAN, Northeast Normal University
CHINA

Wednesday, May 7
Theme: Precision Agriculture; Soil Health

Francisco Cafaro La Menza

Institution: National University of Mar del Plata

Faculty Advisor: Walter D. Carciochi

Country: Argentina

Title: "Fine-Tuning N20 Emission Factors: A case study for a hairy vetch-maize sequence in Argentina."

Abstract: Measurements of nitrous oxide (N2O) emissions in crop sequences including hairy vetch (HV) and nitrogen fertilization are essential for refining emission factors. Our objectives were to i) determine which nitrogen source (HV or urea) and HV termination time result in lower N2O emissions, and ii) calculate emission factors for the HV/maize sequence. N2O emissions were lower with late termination of HV compared to urea (50 kg N ha-1), and the calculated emission factors for HV residues and urea (<0.12%) were well below the 1% proposed by the IPCC. Utilizing HV could effectively provide nitrogen to maize while minimizing N2O emissions.

Biography: My name is Francisco Cafaro La Menza. I am a PhD fellow from the National Scientific and Technical Research Council (CONICET) at the National University of Mar del Plata, Buenos Aires, Argentina. With a background in agronomy, my research focuses on nitrogen dynamics in the hairy vetch/maize sequence and its effects on nitrous oxide emissions, maize yield, and grain quality. By applying a holistic approach that considers maize productivity and quality, as well as environmental aspects, my goal is to assess management practices related to this crop sequence to assist producers in optimizing their productivity while mitigating greenhouse gas emissions. Recently, I was awarded a training scholarship from the Climate, Food and Farming Network and Global Research Alliance Development Scholarships (CLIFF-GRADS) to collaborate on the project "Mitigating soil GHG emissions in semiarid croplands through improved management" in Zaragoza, Spain. I have been involved in writing and data analysis for two peer-reviewed papers published in international journals, and a few months ago, my first paper as the first author was published in an

international journal. Additionally, I have participated in various national congresses, conferences, and seminars, exchanging ideas with researchers and other graduate students, where I have presented and published results from my research.

Email: francisco.cafa@gmail.com

Xiao Wei

Institution: Northeast Normal University

Faculty Advisor: Jiquan Zhang

Country: China

Title: "Study on fine risk assessment and early warning of maize high wind lodging disaster in Jilin Province."

Abstract: The high wind lodging disaster damaged the maize yield and affected the internal coordination of the agricultural system. Assessment and early warning of maize high wind lodging disasters can effectively hedge the instability of agricultural systems under climate change and reduce agricultural and economic losses. This study constructed a risk assessment model of maize high wind lodging disasters based on multiple indicators to reduce disaster losses and ensure food security. The research results are conducive to adjusting crop primary productivity and promoting net zero emission targets.

Biography: Xiao Wei Second year of master's degree School of Environment, Published two SCI papers as first author: https://doi.org/10.1016/j.agrformet.2023.109730 https://doi.org/10.1002/joc.8070. 1–20 Submit two SCI papers as first author, under review: Xiao Wei, Jiquan Zhang, Dongni Wang, Chunli Zhao, Suri Guga, Ying Guo. Fine Dynamic Assessment and Zoning of Comprehensive Risk of Maize High Wind Lodging Disaster in Jilin Province, China. European Journal of Agronomy （IF=5.2; JCR Q1; SCI District 1, Chinese Academy of Sciences; Top Journal; Under Review); Xiao Wei, Jiquan Zhang , Dongni Wang, Chunli Zhao, Ziming Song, Ying Guo, Xingpeng Liu, Zhijun Tong. Study on fine early warning of maize high wind lodging disaster risk in Jilin Province, China. Agricultural Systems (IF=6.6; JCR Q1; SCI District 1, Chinese Academy of Sciences; Top Journal; Under Review). Participated in the 2023 Natural Disaster Risk and Comprehensive Disaster Reduction Professional Committee of the Chinese Geographical Society in Yinchuan, Ningxia. The report "The spatiotemporal distribution characteristics of

high winds and their impact on maize lodging disasters – Taking Jilin Province as an example" was awarded as an excellent youth report at the 2023 Academic Annual Meeting of the Natural Disaster Risk and Comprehensive Disaster Reduction Professional Committee of the Chinese Geographical Society. One computer software copyright was approved. The name is Maize High Wind Lodging Disaster Risk Comprehensive Assessment System V1.0. Registration number: 2024SR0330106. One application for a national invention patent is pending acceptance and is named: A comprehensive risk assessment method for maize high wind lodging disaster.

Email: weixiao@nenu.edu.cn

Kevin Yeffrey Farias Romero

Institution: Technological University of Uruguay

Faculty Advisor: Cindy Ortiz

Country: Uruguay

Title: "Silo bag monitoring system."

Abstract: Silo bags are a cheaper storage option for grain producers that need to keep their harvest from animals, pests, fungi, and humidity of the environment, all of which is compulsory to maintain a consumption-safe and market-valuable product. This option lacks the monitoring capabilities that a conventional silo provides, like real-time measurement of the grain's condition through temperature, humidity, and CO2 emissions. This project aims to develop an affordable device and system capable of being easily expanded and implemented in silo bags, potentially increasing profits as it could help with the early detection of unwanted conditions and symptoms of deteriorating matter.

Biography: I am Kevin Farias, 24 years old, I study Control and Automation Engineering and work at UTEC as a laboratory assistant for the Control and Electronics laboratories at the university. I am solution oriented, love to participate in multidisciplinary projects, usually a very out of the box thinker when problem solving. I am personally interested in languages, fluent in Spanish, Portuguese and English, having recently started learning German with an A1 certificate to date, I also have experience as a high school teacher of computer science and robotics.

Email: kevin.farias@utec.edu.uy

Xiao Li

Institution: Northeast Normal University

Faculty Advisor: Shan Lu

Country: China

Title: "Utilizing Remote Sensing to Estimate Leaf Biochemical Parameters in Advancing Agricultural Net-Zero Emissions Goals."

Abstract: Monitoring leaf biochemical parameters is vital for fire prevention and mitigating over-fertilization. Remote sensing can be used to estimate these parameters through leaf reflection. However, existing methods often neglected the multi-angular properties of leaf reflection, impacting the estimation accuracy of biochemical parameters. To address this, we firstly treated multi-angular reflection as noise and established a difference and ratio vegetation index to remove specular reflection, which controls multi-angular reflection. Secondly, we leveraged multi-angular reflection as valuable information and developed a model by integrating the PROSPECT model with a specular function. These methods enhance estimation accuracy and may advance net-zero emissions goals.

Biography: My name is Xiao Li, and I am a PhD student at Northeast Normal University, China, majoring in Cartography and Geographic Information Systems. My research focuses on multi-angle-polarimetric remote sensing, vegetation radiative transfer modeling, and biochemical parameter estimation using machine learning and empirical methods. I have published two papers as the first author in Remote Sensing of Environment, a prestigious journal with an impact factor of 13.5. Additionally, I have been honored with the Outstanding Presentation Award twice at academic conferences dedicated to remote sensing. I am grateful to have been awarded the National Scholarship for PhD students twice.

Email: lix980@nenu.edu.cn

Maria Paula Iglesias

Institution: National University of Mar del Plata

Faculty Advisor: Nahuel Reussi Calvo

Country: Argentina

Title: “Nitrogen Management practices to increase its use efficiency and minimize gaseous emissions in corn in the Argentine Pampas.”

Abstract: This project aims to generate and integrate knowledge on the effect of the source and fractionation of N that allows improving corn productivity, N use efficiency and minimizing gaseous emissions, in laboratory and field conditions, in the face of different conditions. of water availability. Under controlled conditions and in the field, losses due to volatilization and the emission of nitrous oxide will be determined. Additionally, in the field, the corn yield will be determined. Finally, decision models will be generated to improve the efficiency of N use and mitigate gas emissions.

Biography: My name is María Paula Iglesias, I am an Agricultural Engineer. In 2017 she entered the Faculty of Agrarian Sciences of the National University of Mar del Plata (UNMdP) and in 2022 she obtained the title of Agricultural Engineer. Currently, I am completing the postgraduate degree to access the title of Doctorate in Agricultural Sciences at the UNMdP and I participate in the Agricultural Soil Science chair as an Associate Assistant. THESIS COMMITTEE Postgraduate student: Agr. Engineer. Iglesias, María Paula Director: Agr. Engineer. Dr. Nahuel Reussi Calvo Co-Director: Agr. Engineer. M. Sc. Dr. Nicolás Wyngaard Advisors: Agr. Engineer. M. Sc. Dr. Hernán Sainz Rozas Blgo. Dr. Nuria Lewczuk

Email: pauliiglesias11@gmail.com

Berenice Montano Rodriguez

Institution: Zamorano Pan-American Agricultural School, Honduras

Faculty Advisor: Leonardo Deiss

Country: Honduras

Title: “How does the management of dual-use perennial grain systems affect soil health?”

Abstract: Perennial grain systems can help increase soil aggregate stability, which is a soil health indicator that plays a prominent role in building soil structure and storing organic carbon occluded within aggregates and pore networks. The objective of this study was to evaluate the effect of forage defoliation intensity in dual-use perennial grain systems on soil aggregate stability. Soil samples were collected from the 0-20 cm depth in the fourth year after the establishment of Kernza Dual-Use experiments in three locations: Ohio 1, Ohio 2, NY, Minnesota, and Kansas. Trials were planted with the commercially available variety Clearwater Kernza (1504) in a randomized complete block design with four replicates and included four defoliation treatments (forage harvests) at: (i) Summer after grain harvest, (ii) Spring+Summer; (iii) Fall+Summer (iv) Spring+Summer+Fall. Soil wet aggregate stability was determined using nested sieves submerged in water to disaggregate soil through shaking. Oven-dried soils were initially sieved to particle size <8mm, then laid on top of a stack of four sieves with different opening sizes (2000, 500, 250, and 53 μm), ordered bottom-up from the smallest to the largest opening. The stack of sieves was repeatedly submerged into a water-filled bucket for 10 minutes in 2-second intervals. This process determined the proportion of soil-stable aggregate that remained at each sieve size. We found that there were no differences among defoliation treatments over the size and distribution of the aggregates in dual-use perennial grain systems. These results represent an opportunity for growers to sustainably intensify forage harvesting in perennial grain systems while maintaining the productivity potential and health of these systems.

Biography: My name is Berenice Montano; I am finishing my Visiting Scholar program at The Ohio State University with The Soil Fertility Lab. I studied Environmental Engineer and Development at Zamorano University. And I am an upcoming master’s student in the Food Science Department at The Ohio State University. I won the Engime Axium Scholarship for my master’s degree because of my compromise in sustainable proposals. It motivates me to keep including sustainability in the food industry and my studies. My career goal is to be a scientist in the food industry who innovates in methodologies related to human health and the environmental impact reduction of food.

Email: montabire@gmail.com

Xiao Tingting

Institution: Northeast Normal University

Faculty Advisor: Donghui Wu

Country: China

Title: "**New sight on the underestimated species diversity and ecology function in soil fauna"**

Abstract: Exploring species and their functional diversity is of fundamental importance in biology and ecology. Many earthworm species comprise a wide range of genetic cryptic species, but it remains unclear whether these cryptic species represent distinct ecological entities that differ in traits. The significant differences in multiple traits indicate that the two lineages have different physiologies, supporting their status as cryptic species. The documented variations in morphological and stoichiometric traits of the two lineages/cryptic species call for integration of genetics and ecology for understanding biodiversity and ecological functioning of soil animal species.

Biography: Environmental Science student interested in soil animal diversity and ecological function.

Email: 15556965332@163.com

Liping Wang

Institution: Northeast Normal University

Faculty Advisor: Kaishan Song

Country: China

Title: "**h–resolution soil organic carbon mapping in Eastern China: Exploration of controlling factors through spatial analysis."**

Abstract: Soil organic carbon (SOC) accounts for approximately two – thirds of the terrestrial carbon pool, playing a pivotal role in maintaining soil ecosystem health and achieving sustainable agriculture. With the advancement of remote sensing technology, high spatial resolution SOC map is crucial for accurate assessing soil carbon reserves and guiding precision agricultural management. This study aims to explore the role of various factors (climate, remote sensing, vegetation, topography, soil types) affecting SOC mapping in Eastern China, and to develop a 30 – m spatial resolution map of SOC in cropland.

Biography: Liping Wang, Northeast institute of Geography and Agroecology, Chinese Academy of Sciences, major in soil science. Main research focus is soil remote sensing, investigating the spatiotemporal variability and influencing factors of soil organic carbon. Served as a reviewer for the Geoderma journal and published 8 SCI papers.

Email: wangliping@iga.ac.cn

Pamela Barboza

Institution: Technological University of Uruguay

Faculty Advisor: Wilmar Pineda

Country: Uruguay

Title: "**A Sensor Monitoring System Based on the Internet of Things and its application to soil health."**

Abstract: The Internet of Things (IoT) has demonstrated significant potential in sensor monitoring, enabling sensors to share information over the internet, benefiting various applications. This project specifically develops an IoT-based monitoring system to transmit sensor data to the cloud, showcasing its potential in soil temperature profile measurement. Instrumentation circuits facilitate the necessary measurements, transmitting data to the cloud through IoT platforms. The collected data is organized in a remotely managed database accessible via a user interface. This scalable solution can be applied to agriculture, offering insights into soil health.

Biography: I am Pamela Barboza from the University of UTEC. My engineering background has allowed me to tackle real-world challenges, especially in developing solutions for monitoring soil temperature and waste management. Currently, I am pursuing a postgraduate degree in cybersecurity at the Universitat Oberta de Catalunya (UOC), where my final thesis focuses on the risks that IoT networks can pose in different applications and how to mitigate the risks of unauthorized access to information. My achievements include the implementation of IoT-based monitoring systems and research on sensors and communication protocols. My goal is to continue advancing in the field of IoT and AI.

Email: pamela.barboza@utec.edu.uy

Anne Charris Han

Institution: Northeast Normal University

Faculty Advisor: Donghui Wu

Country: Philippines

Title: "**Taxonomic Study of Earthworms in Northeastern China and its Ecological Functions in the Environment."**

Abstract: Earthworms are soil inhabitants that play a very vital ecological role in soil health and processes. Currently, more earthworm taxonomic works are invested in the southern region of China compared to the northern region, despite the fact that mollisols in Northeast China are among the most valuable soil resources for sustainable agriculture. We have investigated earthworm occurrences in Northeastern China and its ecological functions in soil. Proper identification of earthworms is crucial and foundational in any given ecological and environmental studies.

Biography: My name is Anne Charis Han, I'm a filipino and now currently taking my masters in Northeast Normal University, Changchun City, China. My major is Environmental Science, however my current discipline of study concerns with the taxonomy and phylogenetics of earthworms in Northeast China, particularly a group of earthworms- Pheretimoids. I believe that taxonomic work is the foundation for ecological and environmental work when involving organisms. I look forward to in studying earthworms and its effects, contributions and its deeper relationships to the environment and even with climate change.

Email: annecharishan@gmail.com

Li Yue

Institution: Northeast Normal University

Faculty Advisor: Shubin Lan

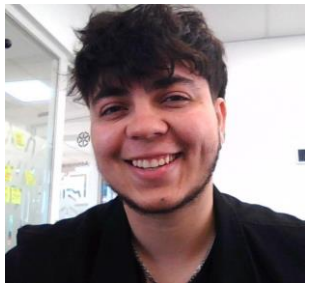
Country: China

Title: "The impact of grazing disturbance on the development of biocrusts and the microbial community."

Abstract: Overgrazing is a major driver of dryland degradation, however, so far, there is limited understanding on how this process affects biocrust-related microbial community and especially, how the key groups respond to grazing disturbance. In this study, quantitative polymerase chain reaction (qPCR) and high throughout sequencing technologies were used to investigate the bacterial community abundance and diversity in the Horqin Sandland (China) experienced different livestock grazing disturbances, in order to examine whether a shift in bacterial community (in particular the key biocrust components-cyanobacteria) was involved, and how this was linked to biocrust development and altered soil carbon and nitrogen storage.

Biography: My name is Li Yue, and I'm a postgraduate student majoring in ecology from life science faculty of Northeast normal university. My study direction is meanly about the impact of grazing on biocrusts in arid areas. hope I will have this opportunity to communicate with different students from all over the world.

Email: 1248663787@qq.com



Juan Manuel Deniz

Institution: Technological University of Uruguay

Faculty Advisor: Cindy Ortiz

Country: Uruguay

Title: “Innovative Applications of Drones with Computer Vision and AI in Enclosed Agricultural Environments.”

Abstract: Overgrazing is a major driver of dryland degradation, however, so far, there is limited understanding on how this process affects biocrust-related microbial community and especially, how the key groups respond to grazing disturbance. In this study, quantitative polymerase chain reaction (qPCR) and high throughout sequencing technologies were used to investigate the bacterial community abundance and diversity in the Horqin Sandland (China) experienced different livestock grazing disturbances, in order to examine whether a shift in bacterial community (in particular the key biocrust components-cyanobacteria) was involved, and how this was linked to biocrust development and altered soil carbon and nitrogen storage.

Biography: My name is Juan Deniz. I am 22 years old, and I am a student of Control and Automation Engineering at the Technological University of Uruguay (UTEC). I graduated in 2023 with a degree in Industrial Mechatronics Technology. My research primarily focuses on Control Theory and Control Design Methods, Robotics, and Artificial Intelligence. In 2022, I achieved second place in the Industrial Control category at the WorldSkills Chile competition. Additionally, I received an Honorable Mention at FEBITEC 2023, a regional congress and binational innovation fair.

Wednesday, May 8
Theme: Rural Development and Policies; Climate-Energy-Environment Nexus; Water

---

Angela Price

Institution: University of Tennessee

Faculty Advisor: Jie Zhuang

Country: United States of America

Title: "**Food-Energy-Water Analysis of the Bipartisan Infrastructure Law."**

Abstract: In light of the Bipartisan Infrastructure Law under the Biden-Harris administration, we must look closely at the initiatives and solutions to bring green industries to the Appalachian region. The Appalachian region has seen over a century of industrialization and depletion of natural resources for economic growth. As these resources were depleted, the struggles in Appalachia continued to grow. With a growing population and an increasing poverty rate, bringing economic growth back to the region is imperative for quality of life. This presentation will cover the Bipartisan Infrastructure Law, projects it has funded, and decisions to be made.

Biography: Hi, my name is Angela Price, and I am a master's student advised by Dr. Jie Zhuang at the University of Tennessee. I obtained my bachelor's in environmental science with a concentration in Life Science from Appalachian State University. Growing up and pursuing my undergraduate education in rural Southern Appalachia shaped my research. Living in a USDA-defined food desert and in a town where the poverty rate is nearly 21%, I find self-sufficiency to be a powerful method of resiliency and advocacy. My thesis focuses on reducing food deserts throughout the Appalachian region through the promotion of industry revitalization and small-scale farming. This work will ultimately result in a food desert reduction roadmap. This manuscript compiles all collected data and relationship analysis into a tool that provides a guideline on addressing and reducing food deserts.

Email: aprice57@vols.utk.edu

Andres Mayorga

Institution: Zamorano Pan-American University

Faculty Advisor: David Ader

Country: Honduras and United States of America

Title: "**Perception of the impact of climate change and adaptation measures on the livelihoods of fishing communities in the municipality of Marcovia."**

Abstract: Climate change stands as one of the primary challenges confronting humanity, significantly impacting livelihoods. Fishing communities bear the brunt of these effects firsthand. This study delves into the perceptions regarding the impacts of climate change and the adaptation measures on the livelihoods of fishing communities in the municipality of Marcovia in Honduras. Employing a mixed methodology, data was gathered through 133 semi-structured surveys, three focus groups, as well as historical rainfall data and satellite imagery. According to the perceptions within fishing communities, the discernible trends of climate change include rising temperatures, increased precipitation, heightened swell intensity, and the loss of approximately 100 hectares of coastline. The principal impact of climate change in the municipality of Marcovia manifests in the deterioration of local infrastructure, thereby hampering income generation and prompting a surge in climate-induced migration. Direct adaptation measures primarily revolve around mangrove reforestation and infrastructure adjustments to counteract rising sea levels. Indirect measures entail the adoption of new technologies for species identification and the exploration of alternative fishing grounds, thereby exacerbating pressure on fishery resources. Given the anticipated impacts and required adaptation measures, responses necessitate initiatives aimed at alleviating strain on fishery resources and fostering economic diversification. It is recommended that a prospective investigation be conducted into swell intensity and sea level rise to facilitate the relocation of affected populations.

Biography: My name is Andrés Mayorga and currently I am in a research visiting scholar position at the University of Tennessee Knoxville. My bachelor's degree is in Environment and Development, and I am an upcoming MS student of Rural Sociology and International Agricultural Development at Penn State University. My research interest is focused on food systems, specifically on how indigenous studies, gender, climate change, and sustainable agriculture can be integrated into policies, programs, and projects that help into the reduction of food insecurity and poverty rates.

Email: amayorga@utk.edu

Michelle Boutelle

Institution: University of Tennessee

Faculty Advisor: Tom Gill

Country: United States of America

Title: "**Equitable Scaling of Postharvest Technologies."**

Abstract: Emerging technologies and innovative business models offer promising solutions to reduce food waste and loss, which currently result in significant water and energy wastage and contribute substantially to greenhouse gas emissions during production. However, scaling up these technologies inevitably brings both positive and negative impacts to the diverse range of stakeholders in American food systems. Scaling tools used by global development practitioners are applied to emerging technologies and business models to proactively identify ways to reduce food loss and waste equitably, ensuring that no community is left behind in the fight against hunger and climate change.

Biography: I am a first-year Master's student at the University of Tennessee and a U.S. Department of Agriculture National Needs Fellow for international trade and development. My research explores the intersection of gender and climate impacts on agricultural extension systems in Southeast Asia. My career goal is to specialize in data-driven design, monitoring, and evaluation of international agricultural development projects.

Email: amayorga@utk.edu

Kali Butler

Institution: University of Tennessee

Faculty Advisor: Mark Radassovich

Country: United States

Title: "**Sea-Garden Fortification Systems- The possibility of a bio-dynamic future."**

Abstract: As global sea levels continue to rise, pressure is felt disproportionately by coastal cities to implement designs strategies that not only protect the coastline from erosion but also assist in greenhouse gas reduction. Sea-Garden Fortification Systems are integrative solutions that combine three novel research concepts- Living Seawalls, CorPower's HiWave- 5 energy converters, and sustainable Aquaculture- to enhance coastal development utilizing (FEW) Nexus principles.

Biography: This presentation proposes a shift from current coastal armoring systems to a comprehensive approach that aims to not only reduce sea level rise, but to reduce climate change entirely. My name is Kali Butler, and I am a first term master's student in Environmental & Soil Sciences at the University of Tennessee, Knoxville. Upon graduation, I aim to find a job in sustainable urban development while obtaining a second master's in Urban Planning and Environmental Architecture.

Email: amayorga@utk.edu

Romina Beloqui

Institution: Technological University of Uruguay

Faculty Advisor: Victoria Laniella & Raisi Lenz

Country: Uruguay

Title: "**Diagnosis of the presence of microplastics and agrotoxics in the leachate sedimentation water."**

Abstract: The objectives of the project were to diagnose the presence of microplastics and other contaminants that contain agrotoxins in the leachate sedimentation water of the city of Rivera. The project planned to carry out initiatives to improve the community's contribution to selective collection to reduce the environmental impact of household solid waste in bodies of water. A theoretical approach was made to a proposal to improve water quality through a biochar-based filter. The project sought to consolidate future lines of work to improve the culture of selective collection in the city. The Sustainable Development Goals associated with this work were 6 and 11.

Biography: My name is Romina Beloqui, I am a UTEC student, studying the fourth year of Logistics Engineering, my professional objective is to make a significant contribution to the optimization of resources in supply chains. It is of great interest to me to collaborate with environmental care and reduce the impact on the environment. I was interested in the proposal since in Uruguay we exploit agriculture. I have previously participated in the organization of the Second Sustainable Supply Chains Seminar, held at UTEC at the beginning of this month; I have also participated in other projects that involve composting and environmental impact.

Email: romina.beloqui@estudiantes.utec.edu.uy

Huiwen Yang

Institution: Northeast Normal University

Faculty Advisor: Dandan Zhou

Country: China

Title: "**Unveiling the significant roles of phytohormone 6-benzylaminopurine (6-BAto empower microalgae for high-salinity wastewater treatment and bioresources recovery"**

Abstract: High-salinity wastewater presents challenges such as osmotic stress and ionic toxicity, inhibiting microalgal biomass conversion. The application of 1 μM 6-BA was found to activate the microalgae's resistance system, boosting the synthesis and transport of extracellular polymeric substances by coordinating calcium signaling and regulating ion transport and osmoregulatory substance synthesis, leading to increased biomass and flocculation. Additionally, 6-BA enhanced metabolic pathways for carbohydrate, and lipid synthesis, increasing production of polysaccharides, proteins, and lipids. These findings suggest that 6-BA can enhance food safety and clean energy sustainability. The study contributes new insights into phytohormone-assisted high-salinity wastewater treatment and microalgal resource transformation.

Biography: Yang Huiwen Gender: Female Age:1997.04 Email Address：yanghw110@nenu.edu.cn Institution: Engineering Lab for Water Pollution Control and Resources Recovery of Jilin Province, School of Environment, Northeast Normal University, Changchun 130117, China Discipline: Environmental Engineering Research Direction: Eukaryotic microalgae wastewater resource treatment Summary： Yang Huiwen: Ph.D. candidate. The main research direction is eukaryotic microalgae wastewater treatment and recycling. From Engineering Lab for Water Pollution Control and Resources Recovery of Jilin Province, School of Environment, Northeast Normal University, Changchun 130117, China. In the key areas of environmental microbiology, wastewater treatment and resource utilization, as well as water pollution control, I possess a solid foundation of professional knowledge and theoretical grounding. I am proficient in the use of AI, Origin, Gephi, and other graphing software, combining metagenomic data to deeply analyze and study the metabolic regulation mechanisms of microorganisms in the process of wastewater treatment and resource recovery. Publications: [1] Yang H.W., Zhao Z.H., Liu Y., Fu, L., Zhou, D.D., et al. The p-hydroxybenzoic acid enhanced lipid accumulation of Chlorella under antibiotic stress[J]. Resources, Conservation and Recycling, 2023, 190:106758. [2] Zhao Z.H., Yang H.W., Feng Z.X., Fu, L., Zhou, D.D., et al. Role of naphthaleneacetic acid in the degradation of bisphenol A and wastewater treatment by microalgae:

Enhancement and signaling[J]. Chemosphere, 2022, 307(Pt 2):135829. [3] Liu Y. Zhao Z.H., Yang H.W., Fu, L., Zhou, D.D., et al. Trace phenolic acids simultaneously enhance degradation of chlorophenol and biofuel production by Chlorella regularis[J]. Water research,2022,218:118524.

Email: yanghw110@nenu.edu.cn

Dalila Cabañas

Institution: School of Agriculture, University of Buenos Aires

Faculty Advisor: Santiago Nicolas Fleite

Country: Argentina

Title: "**Electrochemical oxidation as treatment of cattle feedlot wastewater**."**"**

Abstract: Cattle feedlot wastewater contains a high load of phosphorus and nitrogen, these effluents can reach surface water bodies, affecting their quality for different uses. After a correct treatment, the effluent´s nutrients can be used as fertilizers. A possible treatment for the removal of NO2- would be the use of electrochemical oxidation technologies. When studying the electrochemical oxidation of NO2- in a cell with graphite electrodes, removal percentages greater than 90% have been obtained. This is interesting because the highest conversion percentages were achieved in the presence of Cl-, an ion that is found in high concentration in these effluents.

Biography: My name is Dalila Alejandra Cabañas, I am a graduate in Environment Sciences from the University of Buenos Aires. I am working for the Agronomy Faculty of the University of Buenos Aires as a research intern. In this position, I research effluent treatment and water quality.

Email: dcabanas@agro.uba.ar

Bailey Dills

Institution: University of Tennessee

Faculty Advisor: Mark Radosevich

Country: United States of America

Title: "**Constructed wetlands for wastewater treatment in urban areas."**

Abstract: Urbanization generates an unprecedented strain on global resources. In the face of consumption and waste production, there is a growing threat to water security. To decrease reliance on modern remediation facilities, constructed wetlands (CWs) are a viable option for natural reclamation. CWs utilize intrinsic biochemical and physical processes that provide several ecosystem services in the urban environment. Aside from water storage and management, wetlands furnish aesthetic, blue-green infrastructure to the surrounding community. With adequate monitoring, CWs are a beneficial tool for carbon sequestration, reducing climate change impacts. Funding for CW projects could be linked to the carbon credit market.

Biography: My name is Bailey Dills. I am a master's student at the University of Tennessee, studying Environmental and Soil Sciences. My research interests include wastewater remediation and viral ecology.

Email: dcabanas@agro.uba.ar

Diego Wassner

Institution: School of Agronomy, University of Buenos Aires

Faculty Advisor: Edmundo Ploschuk

Country: Argentina

Title: "**The Acrocomia totai palm tree as a new crop for bioenergy and food in Argentina."**

Abstract: Acrocomia totai is a native palm known for its high fruit production with the presence of two types of oils suitable for various applications such as bioenergy, food, and industrial uses. Additionally, the extracted flour can be used in food processing. Growing this on degraded lands holds the potential to engage small-scale farmers in Argentina. With a perennial cycle of approximately 25 years, Acrocomia emerges as a valuable tool for carbon sequestration efforts, and Argentina has the southernmost populations of this species, representing an ignored genetic resource. My project aims to generate technological and eco-physiological insights to support its cultivation.

Biography: My name is Diego Wassner, I am an agricultural engineer and I work in the Chair of Industrial Crops of the Faculty of Agronomy of the University of Buenos Aires.
I am currently doing my doctorate, with the native palm Acrocomia totai. My professional profile is linked to research into new crops for marginal environments and the development of new crops for bioenergy. In this context I worked with oilseed species such as castor bean, jatropha and currently with Acrocomia. I am particularly interested in research in crop ecophysiology, aimed at generating information that then allows designing agronomic management practices. I strongly believe in the link between the private sector and the university, and in that context, I worked on several productive projects for the development of new crops with jatropha and castor bean. Currently I believe that the Acrocomia palm has a high chance of becoming a productive alternative for oils and foods, which also provides environmental and social solutions.

Email: dcabanas@agro.uba.ar

Sydney Logwood

Institution: University of Tennessee

Faculty Advisor: Nutifafa Adotey

Country: United States of America

Title: "Oil Seed Crops for Aviation Fuel: Ending the "Food Versus Fuel" Debate."

Abstract: 2.5% of Global CO2 emissions are contributed from burning of non-renewable fossil fuels in the aviation industry. Other sectors contribute larger amounts of CO2, but the industry facing most challenges meeting net zero emission goals is aviation. Biofuels are a renewable and sustainable alternative capable of reducing CO2 emissions and sequestering carbon. The debate between land use allocation for food production to feed growing populations and fuel crop production has led to the "Food Versus Fuel" debate. Using climate smart agriculture techniques, this perspective proposes the "Food Feeding Fuel" to address land use allocation concerns.

Biography: I received my bachelor's degree in environmental and soil sciences from the University of Tennessee Biosystems Engineering and Soil Science department (BESS) in 2022. I am currently a master's student at BESS studying soil fertility. I plan to pursue a Ph.D. in soil chemistry. My research interests include environmental sustainability and soil conservation.

Email: slogwood@vols.utk.edu

José Santiago Marrero Coitiño

Institution: Technological University of Uruguay

Faculty Advisor: Cindy Ortiz

Country: Uruguay

Title: "**RF heating using GaN technology in agriculture."**

Abstract: Radio Frequency heating is currently used in many ways, one of them is for heating and drying glue between wood panels. Nowadays the most commonly used technology is vacuum tube-based oscillators, this technology achieves a maximum efficiency of 60%. However, the new technologies offer an alternative to this issue, the Gallium Nitride (GaN) transistors are much more efficient than vacuum tubes, the circuit based on GaN technology reached 90% efficiency in laboratory tests. So, this technology seems promising to replace the "inefficient" and older technology. Reference: Modeling and Operation of Series-Parallel Resonant Load in Industrial RF Dielectric Heating Application, 2023.

Biography: José Marrero received an intermediate degree as a Mechatronics Technologist last year. He is currently taking the ninth semester in control and automation engineering at Universidad Tecnológica del Uruguay (UTEC).

Email: jose.marrero@utec.edu.uy

Liu Min

Institution : Northeast Normal University

Faculty Advisor: Jianying Ma

Country: China

Title: "**Time-lag and accumulation effects of extreme precipitation on global vegetation dynamics since the 21st century."**

Abstract: As a major component of global climate change, extreme climatic events are predicted to increase in duration, frequency, and intensity. However, our knowledge regarding how changes in extreme climatic events may influence vegetation composition and productivity remain insufficient, especially the time-lag and accumulative effects, which have emerged as a crucial yet often overlooked aspect in assessing climate change induced vegetation dynamics. Based on daily precipitation data, we evaluated the temporal effects (time-lag effect and accumulative effect) of the 11 extreme precipitation indices on the global Normalized Difference Vegetation Index (NDVI) in the 21st century.

Biography: Second-year Ph.D. student. Focus: Extreme Climate Change and Vegetation Dynamics