PURDUE UNIVERSITY | Environmental and Ecological Engineering

EEE Research Seminar
Date: January 28th, 2025, at 10:30AM
Location: POTR 234 (Fu Room)

Kevin Orner, Ph.D.

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Leveraging Machine Learning and Stakeholder Engagement to Promote Sustainable Resource Recovery

Abstract
The National Academies Grand Challenges and the United Nations Sustainable Development Goals motivate efforts to recover beneficial resources from waste streams. Although rural regions are prime locations for resource recovery because they can be abundant in animal manure and agricultural crop residue, such regions face challenges in implementing resource recovery technologies due to limited technical and economic resources and lack of community engagement and contextual policy support. Dr. Orner will share challenges and opportunities for community-engaged, interdisciplinary research based on his experiences leading three projects. The first project, an NSF-funded international research experience for students in Costa Rica, is in collaboration with anthropologists and community stakeholders in a rural ecotourism community in Monteverde, Costa Rica. In Summer 2024, six students received cross-training in anthropology and environmental engineering, conducted sampling and analysis of septic tanks and composting toilets, and conducted interviews with local stakeholders before sharing their results at a community meeting. Six students will participate in Summer 2025 and Summer 2026 to investigate semi-centralized and centralized wastewater treatment technologies, respectively.
Secondly, Dr. Orner will share lessons learned from an EPA-funded research project on sustainable nutrient management of wastewater lagoons in collaboration with stakeholders in rural wastewater utilities and industry. Outputs from the project include an online US lagoon atlas, a critical literature review and LCA/LCCA of lagoon nutrient management technologies, a multi-criteria decision support tool for rural wastewater utilities considering nutrient management upgrades, and machine learning approaches to identify wastewater lagoons using aerial imagery. Lastly, Dr. Orner will share his current NSF CAREER-funded research on resource recovery from organic waste integrating LCA, policy analysis, and machine learning in collaboration with farmers and rural communities in Costa Rica and the eastern panhandle of West Virginia.

Bio
Kevin Orner is an Assistant Professor at West Virginia University in the Department of Civil & Environmental Engineering. He obtained a B.S. in Civil & Environmental Engineering from the University of Wisconsin-Madison, where he had formational experiences serving as Project Manager for an Engineers Without Borders greywater piping project in El Salvador and implementing a drinking water upgrade in Otavalo, Ecuador for his Senior Capstone project. Those experiences inspired him to serve for two years as a Water and Sanitation Engineer in the Peace Corps in Panama. Kevin completed his Master's and PhD in Civil and Environmental Engineering at the University of South Florida, has engineering consulting experience, and was awarded a Fulbright Research Grant to study the recovery of nutrients and energy from animal manure in Costa Rica. From 2019-2021, Kevin was a postdoctoral researcher at the University of California, Berkeley working on nutrient recovery from concentrated waste streams. Kevin recently received a CAREER award by the National Science Foundation, its top award for junior faculty. His research group at West Virginia University improves human and environmental health locally and globally through the safe and sustainable recovery of resources from waste streams.