Mortenson Center in Engineering for Developing Communities
UNIVERSITY OF COLORADO **BOULDER**

Research Seminar

System-Based Engineering Approaches to Sustainability & Global Challenges

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Date: Monday, February 26, 2018
Time: Noon to 1:00pm
Location: SEEL 303 (lab building at SEEC)

Abstract:

Amid the complex intersection of human, engineered, and environmental systems, topics of sustainability, community resilience, innovation adoption, and climate adaptation emerge. System dynamics (SD) modeling is a computational technique that can be used to map and manage this complexity. The approach reflects factors and dynamics with mathematical equations to simulate a system's behavior over time. Drawing from extensive community based field experiences and interdisciplinary partnerships between engineers with anthropologists, the mixed method approach (i.e. surveys, interviews, participatory observations, water quality analysis, and process-based mass balance analysis) is employed to populate the SD model and evaluate its simulated behavior. This research uses both literature-based theories and context based data to enhance the model's ability to simulate site-specific behavior. In particular, this talk will provide an overview of a few ways systems based approaches, both conceptually and empirically, are being applied to international development projects. First, a conceptual model will reflect the fundamental dynamics and feedbacks between the United Nation's Sustainable Development Goals in order to identify leverage points at which practitioners can strategize effective ways to influence far-reaching impacts. Next, an in-depth empirical analysis will show the ways a wastewater-based resource recovery (RR) system provided a paradigm shift away from a traditional approach to wastewater treatment towards the productive recovery of water, energy and nutrients in Belize. The SD model was developed to identify strategies that improved the adoption and sustainability of the RR technology. Marketing and technical strategies increased the stock of adopted and sustained RR systems, but the improvements were only incremental. Instead, when the structure of the SD model was changed to remove key bottlenecks and improve adopters' behaviors, transformative impacts were made to the long-term management of the community's wastewater resources. Other systems-based projects, publications, and applications will also be discussed to show the broad scope of impact this approach has across engineering disciplines and within the field of international development. In closing, the talk will cast a vision forward for community-based model building within and between groups of development actors (e.g. academic, community, utility, and governmental) to determine effective ways to address common pitfalls in international development projects (e.g. resource use, siloed decision making, engaging vulnerable populations, equitable access to project benefits, etc.).

Biography:

Christine "Christy" Prouty is pursuing her Ph.D. in environmental engineering at the University of South Florida. Her research interests include interdisciplinary work investigating the complex interactions between human, engineered, and environmental systems, the benefits of stakeholder involvement at all phases of development projects' life cycles, the water-energy-food-systems nexus, the social, environmental, and economic impacts of tourism development, and the cultural context into which wastewater and other environmental innovations should be installed. The most enjoyable part of Christine's work is when her dissertation research and various academic activities have provided the opportunity to live abroad and work with communities, universities, utilities, and non-governmental organizations in Barbados, Belize, and Uganda. She enjoys spending time with and getting to know her partners in the communities where she's working. Christine earned her MS degree in environmental engineering through the University of South Florida's Peace Corps Master's International program where she served in Uganda as a water, sanitation, and hygiene volunteer. Her undergraduate degree is in environmental engineering from Louisiana State University.

For seminar information, please contact Bernard Amadei at Amadei@colorado.edu