

Hybrid lecture:
on-site & via
Zoom

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Prof. Ray Huffaker

“Reconstructing resilience of real-world economic, hydrological, and biophysical systems to extreme climatic events from observational data “

October 27, 2022, 9:00 h CEST

Abstract

Resilience analysis is widely applied to assess the dynamic response of real-world economic, hydrological, and biophysical systems to catastrophic climatic and environmental events occurring globally at unprecedented magnitude and frequency (e.g., extreme temperatures, floods, droughts, rising sea levels, and wildfires). Currently, investigators engaging in resilience analysis face a daunting selection of competing framings—contingent on wide-ranging potential dynamic responses of a system exposed to extreme events—without empirical guidance on how to infer which framing represents a meaningful reality from observational data. As a result, investigators may contribute misleading resilience analyses only fortuitously corresponding to real-world systemic behavior that public officials are charged to manage and regulate. The seminar seeks to provide missing empirical guidance by formulating a novel diagnostic workflow that begins at ground-zero observation of time series records of system covariates and directs investigators through a sequence of testable hypotheses pointing the way to a resilience framing and analysis representing a meaningful reality. The diagnostic workflow relies on empirical nonlinear dynamic methods to reverse-engineer (reconstruct) state-space dynamics from sequential data to diagnose which type of dynamic system response is the most likely source of irregular fluctuations characterizing observational watershed data. The seminar will draw implications for how current resilience framings must adapt to accommodate the potential for complex real-world systems exhibiting emergent nonlinear-deterministic dynamics. Finally, the seminar will leverage empirically reconstructed watershed dynamics to develop an AI-based early warning system for systemic resilience to extreme climate events—capable of forecasting systemic responses out-of-sample.

About the speaker

Ray Huffaker works in the ecosystems complexity group in the Department of Agricultural and Biological Engineering at the University of Florida, USA. He specializes in empirical nonlinear dynamics techniques; biological and economic modeling of water and other ecosystem resources; economic and food system dynamics; and natural resource and environmental law. He teaches doctoral courses in nonlinear data diagnostics and biological modeling. He co-authored a book on Nonlinear Time Series Analysis: Huffaker, Bittelli, & Rosa (2017), Nonlinear Time Series Analysis with R, Oxford University Press.

Registration / Zoom Link

Registration is mandatory, if you would like to attend in person. To do so, please click [here](#). The lecture will also be available via Zoom (talk will be recorded and published afterwards). Zoom access:
<https://uni-bonn.zoom.us/j/93369202266?pwd=MWNqZ3lUSzFlRGtGZjJkMGgvR2M0Zz09>
Meeting-ID: 933 6920 2266; Code: 939753

About the Lecture Series

The lecture series on Innovation Pathways to Sustainability is organized by the TRA Sustainable Futures. It is a forum for high profile and internationally visible scientists who are active in academia or at the science-policy interface. The lectures address an interdisciplinary audience of experts from natural, social, and engineering sciences as well as representatives from international and implementation-oriented organizations.