SESYNC Feedbacks

News from the National Socio-Environmental Synthesis Center

VIDEO SERIES | Basics of Socio-Environmental Systems Modeling

SESYNC's Newest Videos Series Helps Viewers Understand Socio-Environmental Systems and How to Model Them

To solve environmental problems, it is necessary to bring together an understanding of human social systems with knowledge of the natural world. Modeling provides one way to grow this integrated understanding as it can help explore socio-environmental interactions, potential future scenarios, and options for intervening to enhance sustainability.

In SESYNC's newest video series, SESYNC Director Dr. Margaret Palmer provides viewers with the building blocks for understanding socio-environmental systems (SES) and modeling, so they can apply it to their own research.

The first video of this series introduces the fundamental characteristics of SES as complex adaptive systems. This video lays the groundwork for understanding the essential features of SES that researchers must capture in the modeling process. It provides information fundamental to anyone who is interested in or is teaching about coupled human-natural systems, or anyone who is thinking about modeling.

Building the Basics Part 1: Socio-Environmental Systems as Complex Adaptive Systems

The second video of this series discusses the vexing problems associated with SES and explains why defining the problem and the nature of the SES being studied is a significant step in the process. It offers some solutions for overcoming those problems to reach the team's goals. It also touches upon some of the challenges that teams face when they first begin to study SES and of course is relevant to those wanting to model SES.

Building The Basics Part 2: Defining the Problem and Spanning Boundaries

In the third part of the series, Palmer explains when and why researchers use different modeling approaches for different SES.

Building The Basics Part 3: Choosing a Modeling Approach

This video series is part of a larger effort by SESYNC, The Integrated Assessment Society, and the journal *Socio-Environmental Systems Modelling* to provide resources and opportunities for discussion on SES modeling and its challenges. Stay tuned for additional resources coming soon.

Be sure to **subscribe** to SESYNC's YouTube channel to the first to know when new videos are added!

POSTDOC NEWS | Environmental Justice Missing from Planning

New Paper Finds Environmental Justice Rarely Discussed in Green Infrastructure Planning

A new paper published by researcher Dr. **Fushcia-Ann Hoover** of the University of Maryland's National Socio-Environmental Synthesis Center (SESYNC) finds that environmental justice (EJ) is rarely included as a criterion for determining the placement of green infrastructure (GI) in U.S. cities, despite the potential for creating inequality in communities.

Hoover, a postdoctoral research fellow at SESYNC, and her mentor Dr. Sara Meerow, Arizona State University, published this first manuscript based on their SESYNC project **Green and Just** with collaborators. The paper titled, **"Environmental justice implications of siting criteria in urban infrastructure planning,"** examined metrics for the practices involved in locating green infrastructure (GI) based on 119 planning documents across 19 U.S. cities. The dominant metrics for GI placement were related to stormwater, feasibility and cost, or location on public school properties. **Read more.**

TEAM SPOTLIGHT | Disease, Ecosystem Processes, and Humans

Learn More about the SESYNC Pursuit: Microbial disease dynamics, ecosystem processes, and human eutrophication of the environment

Elizabeth Borer and Eric Seabloom are the principal investigators of the SESYNC Pursuit, **Microbial disease dynamics, ecosystem processes, and human eutrophication of the**

environment. This Pursuit is synthesizing the relationships among rates of ecosystem eutrophication arising from human activities, host-pathogen interactions in primary producers, ecosystem processes, and their feedbacks to human health and well-being. The team is tackling this research with a multi-faceted approach that includes developing new models that draw from both disease and ecosystem modeling approaches; synthesizing empirical data from marine, terrestrial, and freshwater ecosystems; and examining two case studies. The group aims to generate novel insights into the cross-ecosystem generality of disease impacts on elemental flux rates, as well as the factors with the greatest potential to feedback and inform management for controlling disease impacts on elemental fluxes.

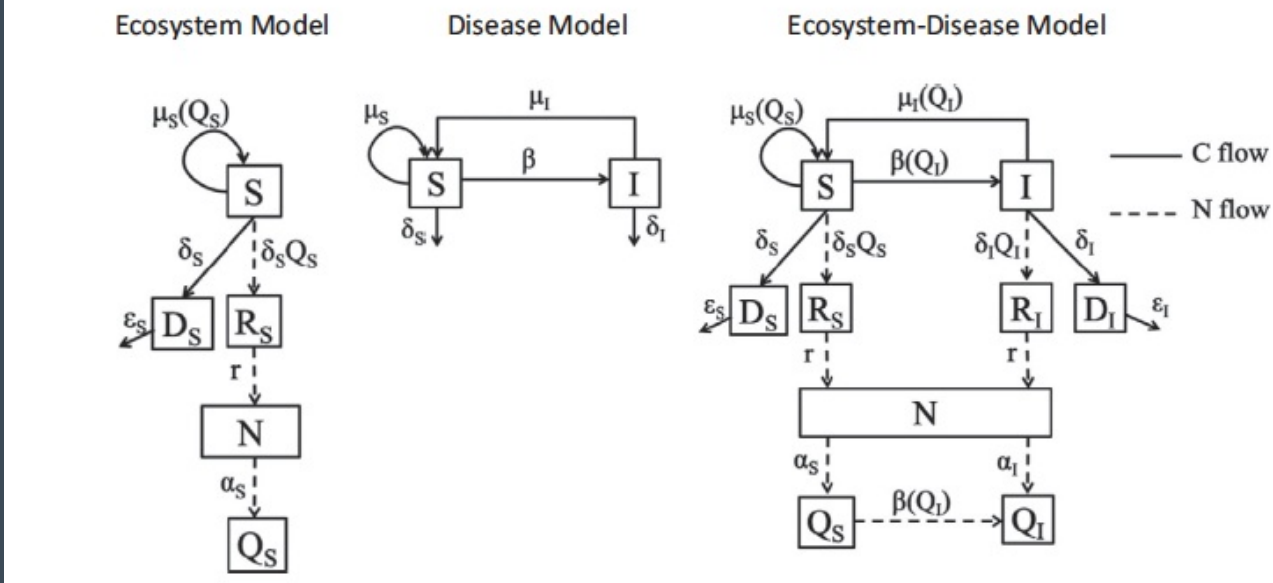
The Pursuit has had three recent publications:

"Changing elemental cycles, stoichiometric mismatches, and consequences for pathogens of primary producers." Published in ***Oikos.***

"Disease-mediated ecosystem services: Pathogens, plants, and people." Published in ***Trends in Ecology & Evolution***.

"Elements of disease in a changing world: modelling feedbacks between infectious disease and ecosystems." Published in ***Ecology Letters***. (See Figure 1 from this paper below.)

Figure 1: The Ecosystem-Disease (ED) model integrates key elements of ecosystem and disease ecology to track susceptible and infected hosts and the role of disease on pools and fluxes of elements.



And, in this **interview with SESYNC**, Elizabeth Borer explains how an innovative modeling approach developed by her SESYNC team is bridging the divide between ecosystem ecology and disease ecology to further their research.

Learn more about this Pursuit **here**.

NEW PUBLICATIONS | SESYNC in the Journals

"COVID-19 Reveals Vulnerabilities of the Food–Energy–Water Nexus to Viral Pandemics." Published in ***Environmental Science & Technology Letters*** by Ryan S. D. Calder, Caitlin Grady, Marc Jeuland, Christine J. Kirchhoff, Rebecca L. Hale, and Rebecca L. Muenich. This paper resulted from the Pursuit Characterizing FEW system typologies across the continental U.S. for informed FEW research.

"Spatial Targeting of Agricultural Support Measures: Indicator-Based Assessment of Coverages and Leakages." Published in ***Land*** by former SESYNC postdoc Matthew C.

LaFevor and colleagues Alexandra G. Ponette-González, Rebecca Larson, and Leah M. Mungai.

"Worldwide border interceptions provide a window into human-mediated global insect movement." Published in ***Ecological Applications*** by Rebecca M. Turner, Eckehard G. Brockerhoff, Cleo Bertelsmeier, SESYNC staff member Rachael E. Blake, Barney Caton, Alex James, Alan MacLeod, Helen F. Nahrung, Stephen M. Pawson, Michael J. Plank, Deepa S. Pureswaran, Hanno Seebens, Takehiko Yamanaka, and Andrew M. Liebhold. This paper resulted from the Pursuit Global socioeconomic drivers of insect invasions.

"Environmental justice implications of siting criteria in urban green infrastructure planning." Published in the ***Journal of Environmental Policy and Planning*** by SESYNC postdoc Fushcia-Ann Hoover and colleagues Fushcia-Ann Hoover, Sara Meerow, Zbigniew J. Grabowski, and Timon McPhearson.

"Effects of seasonal inundation on methane fluxes from forested freshwater wetlands." Published in ***Environmental Research Letters*** by former SESYNC staff member Kelly L. Hondula, former SESYNC Postdoc C. Nathan Jones, and SESYNC Director Margaret A. Palmer.