The dynamics of multiple ecosystem services: Improving models for better management of multifunctional landscapes

Oral Defence by PhD Candidate Jesse Rieb

Natural Resource Sciences

March 13, 2020 @ 1:15 pm — Institute of Parasitology, Room P117

Abstract

People around the world depend on ecosystems to provide them with a variety of benefits, known as ecosystem services (ES). Understanding and quantifying ES is a powerful tool for conserving ecosystems and supporting people's wellbeing, in part because quantification of these benefits allows them to be more easily compared with other costs and benefits and because it demonstrates how conservation of ecosystems can bring real, tangible benefits to people. ES are provided by complex webs of interacting social and ecological components and processes, and decision-makers rely on ES models to make sense of this complexity. In order to be broadly useful to decision-makers who wish to protect the health and well-being of ecosystems and people, ES models must be capable of providing clear and accurate information about when, where, and how ES are provided. In this thesis, I focus on two challenges for current ES models—the spatial and temporal dynamics of ES and the co-production of ES by natural and human drivers—with the aim of developing a better understanding of these aspects of ES provision that can eventually lead to improved ES models. Using a mix of remote sensing, spatial analysis, statistical analysis, and simulation modelling, I show how the interactions among multiple ES are mediated by the configuration of landscapes, how ES provision can be non-linearly related to both natural and technological drivers, and how the dynamics of the drivers of ES provision can lead to unexpected long-term outcomes of ES management decisions. Together, this work helps develop a more detailed understanding of how to manage the dynamic social-ecological systems that provide critical ES.

About the Candidate

Jesse Rieb is a Ph.D. candidate in the Department of Natural Resource Sciences under the supervision of Dr. Elena Bennett. He holds a B.A. in Ecology from Dartmouth College, U.S.A. His doctoral research focuses on developing and improving models that describe how and where ecosystem services are provided in order to increase scientific understanding and improve policies for conservation and sustainable development.