Abstract

Understanding how to balance human well-being and ecological integrity is one of the fundamental challenges in conservation and natural resource management. As our human-footprint on ecosystems expands and deepens, we are increasingly realizing that human well-being is crucial to understanding social-ecological systems and managing them sustainably.

In my first chapter I add to this literature by extending a theoretical model to examine the effects of two biophysical stressors on a marine species. While this model was developed to understand how harvest and climate change may interact to affect species viability, the model instead emphasized the sensitivity of the results to assumptions about human behavior. This result adds to a small, but growing, body of literature that demonstrates the importance of considering resource-users’ dynamics when attempting to predict outcomes for biophysical systems.

Despite conceptual advances in linking human-wellbeing to biophysical dynamics, a major challenge exists in operationalizing these conceptual framings. In my second chapter I use the US West Coast commercial fisheries system as a case study and developed a novel network approach of linking the social system (i.e. fishing communities) to the ecological system (the fish). This approach made use of data collected by management, making it immediately operational for all managed fisheries in the US. Such a conceptual framework represents a major step forward for mapping and quantifying these linkages between social and natural systems. I add to this work by analyzing these resultant networks to show that the topological structure and modularity varied non-randomly, providing additional features that may be useful for mangers seeking to balance human well-being with sustainable populations of fish.

In my third chapter I analyzed patterns of participation across the US West Coast commercial fisheries before and after a major management change in a single fishery. Using individual- and fishing community-level analyses, using the framework described above, I show that the policy affected how fishermen shift their effort across fisheries at the individual level, but community level attributes remain unchanged. This work demonstrates how such social-ecological system level policy analysis may be conducted.

Overall this dissertation helps move us towards a set of tools managers can use to evaluate policy efficacy in commercial fisheries in the face of rapid environmental change while balancing ecological integrity and human well-being.