This thesis seeks to develop approaches to quantitatively include people in food webs. This thesis seeks to develop approaches to focus on the intersection of people and foodwebs: how people’s use of ecosystems drives ecological change, but in tern how ecological conditions can shape human use.

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This work is motivated by the established need to develop quantitative tools to operationalize conservation’s goal of valuing human well-being alongside ecological integrity.

There’s an increasing focus on valuing (and therefore measuring) human wellbeing alongside ecological quality indicators (i.e. biodiversity, ecosystem function).

There’s also an interest in better understanding how people respond to changes in the environment. This stems in part from a human-focused increased interest in human wellbeing and trying to better predict how human wellbeing will change. But it also comes from discplines that are focused on ecology, with the appreciation of rapid environmental change is often mediated by rapid shifts in how people make use of natural resources.

Developing new, nuanced methods for understanding how people interact with their environment and ways to describe them is important for advancing sustainability science (Hickes et al. 2016 Science). That which is not easily measured often disappears from view (Hicks et al. 2016 Science – cited (3)), this is one problem with the social sides of these systems. Relatedly, focusing exclusively on economic measures, which are easily quantified/measured lead to the potential for bias and overemphasis of economic variables to human well-being.

These two interests come together in a new integrated discipline broadly construed as “social-ecological systems”. These are systems are characterized by focusing both on social and ecological compartments.

Another goal is to seek to quantitatively understand social-ecological systems, and develop intuition on how human dynamics are affected by, and affect, ecological processes.

Commercial Fisheries system are a useful case study of human-environment interactions. Fishing has been identified as a major predator for many industrial stocks and fish provide biomass, converted into revenue, as an ecosystem service. The linkages between people and fish populations are direct, unlike many other ecosystem services (i.e. water filtration, carbon sequestration).

In this thesis I am interested in understanding of how fish population dynamics, human dynamics, fishing pressure and ecosystem service flows all vary as ecological, economic and/or management conditions of the system change.

Conceptualized in this way, we can imagine the commercial fishing system

This thesis explores three different ways things can change and people end up mediating resulting ecological outcomes.

1. Ecology drives change in fish, mediated by people: Changes in ecology due to climate change, outcome depends on fishing effort reallocated over space
2. Management change drives ecological change: Changes in management end up changing patterns of participation across unaffected fisheries
3. Social conditions drive ecological change: Differences in socio-economic conditions drive differences in fishing strategy and harvesting pressure.