

Predicting Social Impacts of Climate Change in Fisheries

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Abstract

Introduction to the problem and rationale: Salt-water anglers, commercial fishers and numerous other stakeholders are influenced, socially and economically, by the health and management of marine fisheries. Additionally, through feedbacks, the health of coastal and marine ecosystems is often strongly influenced by the actions and behaviors of recreational anglers and commercial fishermen. Although considerable uncertainty surrounds how climate change will impact the overall health of this coupled system, recent projections and monitoring efforts have already indicated that in many coastal regions of the world, species biogeographic ranges are changing considerably. Generally, these changing species distributions will likely impact fishing communities through the decline or disappearance of some traditionally predominant species, as well as increasing the prevalence of formerly rare or novel species. Understanding the trade-offs associated with these changes and creating appropriate adaptive management strategies to match potential climate-influenced ecological changes will require integrated assessments of numerous ecological and social variables. However, the necessary historical ecological and social data that describe these changes are currently lacking and modeling frameworks that predict the interplay between social and ecological fishery systems remain underdeveloped.

Brief summary of work to be completed: Here we propose a study to assess the impacts of climate change on fishing communities by investigating adaptive capacity, historical impacts of biogeographic range expansions and invasions, the role of fishers and other stakeholders in detecting future changes, and the potential of participatory modeling for overcoming potential stakeholder conflicts. To accomplish this, we will pursue four interlinked objectives. First, we will conduct surveys to document the mental models and adaptive capacity of recreational and commercial fishers to climate-related biogeographic shifts. Next, by coupling the surveys with other citizen observation and traditional fishery-independent data sources, we will investigate the potential value of citizen science for early detection of biogeographic shifts. From these results, we will identify and select up to three fishing communities for objectives three and four. For our third objective, we will use a historical ecology approach to explore long-term patterns of ecological and sociocultural dynamics linked to specific fisheries in each community and strive to disentangle changes driven by gradual change versus episodic events. Finally, we will use a participatory modeling approach by bringing together fisheries stakeholders representing diverse perspectives to identify potential scenarios of conflict, as well as opportunities for building social capital and enhancing adaptive capacity among fishers and managers.

Relevance to the competition and NOAA's Next-Generation Strategic Plan (NGSP): Our proposed study addresses multiple goals within NOAA's Climate Program Office and Next Generation Strategic Plan to better understand the potential impacts of climate on fisheries and fishing communities. Specifically, by documenting historical responses to novel species and measuring adaptive capacity, our study will improve NOAA's ability to predict potential impacts of climate change and variability on fishing communities and identify adaptation options. Further, the surveys and focus groups will involve a comprehensive assessment of climate-related risk perceptions directly benefiting NOAA's objective to develop a climate literate public that understands vulnerabilities and makes informed decisions. We anticipate that all of this information will not only improve our understanding of potential climate change feedbacks between marine ecosystems and fishing communities, but ultimately also prove valuable for developing sound management decisions and adaptation strategies.