Abstract
Informing coastal management adaptation planning and decision making for climate change using an interactive risk-based vulnerability assessment tool

Impacts to coastal areas due to hazards associated with climate change are many: sea level rise, shoreline erosion, hurricanes, and associated tidal surges and flooding. The effects of such changes are exacerbated by human development, which changes land cover and degrades water quality and quantity. Planning for climate change in the context of such diverse stresses poses a significant challenge for coastal managers and communities. They must understand how stresses interact to produce impacts. They must also understand how impacts are related to differences in vulnerability, and how vulnerabilities and impacts can be mitigated via short-term adjustments and longer-term adaptations. In some cases city/town planners can enact changes, but there are some adaptations that must be accomplished by private individuals or organizations. Coastal systems are particularly complex, making it even more difficult for decision-makers to examine the time lags, feedbacks, and nonlinearities affecting climate change impacts. The challenge is exacerbated because planners are confronted with many uncertainties.

Successful adaptation and mitigation of hazard impacts in coastal regions requires the generation of realistic risk and adaptation scenarios and models in processes that pay close attention to producing knowledge that informs decision-making and produces community acceptance. Local decision makers can benefit from a conceptual characterization of hazards that enables them to examine threats, consequences, and management interventions as a causal sequence resulting from a stream of choices and activities. This is best accomplished in a process that involves integrating locally specific knowledge about social stressors with generalized scientific information about potential hazard impacts. We are responding to the recent finding by Tribbia and Moser that: “…what is surprising is that [managers] do not have, do not know of, or do not find vulnerability assessment tools currently available sufficient, and maybe that scientists have not made them more accessible or user-friendly to practitioners.”

We intend to use a recently developed tool to inform scenario-building and planning for coastal management. This tool enables users to construct and display causal pathways that link hazard events, exposures, and consequences with the ways that consequences are mediated by vulnerability. It allows users to focus on elements or pathways of interest while retaining the greater system complexity and to easily elaborate information on pathways. The tool can also promote deliberative-analytical dialogue and we intend to build a collaborative network of local coastal decision makers by having them learn to use the model in applied settings. Our goal is to examine the planning and decision-making support this tool can offer local decision makers in coastal management planning. We will work with coastal managers and community members to evaluate how the tool can structure the gathering and analysis of decision-relevant information, inform adaptive action and resilience strategies, and highlight critical data gaps to inform future monitoring and research activities.