

Decision Model drives Enhanced Adaptive Management in Response to Econo-Climate Changes

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Climate change adds a critical technical element surrounding the management of natural resources. The implications of climate change must be understood, not only by technical experts, but also by natural resource managers, government agencies, and the general public. This diverse audience requires the development of a new paradigm to communicate the specific courses of action to be considered and the impact of uncertain climate factors on the value of those actions. Decision modeling enhances the adaptive management process in a way that allows for identification, summarization, exploration and valuation of the uncertainties and controversies resulting from climate change. We demonstrate a simplified model for a hypothetical wetland management case study inspired by the Florida Everglades restoration needs. Our hypothetical example of enhanced adaptive management uses a probabilistic decision framework based on two objectives - habitat value and operational costs - and includes probabilistic assumptions about the physical relationships between these objectives and the ecosystem dynamics that influence them. The results of the model show that climate assumptions, such as the amount of rainfall, have a major impact on the optimal strategy selection while monitoring quality has a lower impact at least in the case of short-term planning. We find that alternatives that tend to reconstruct the pre-drainage flow are characterized by a very high ecological payoff but also by very high operational costs and low flood control. We show that the value of information related to climate change may enhance better restoration decisions. We propose a multiple ranking of restoration alternatives based on monitoring needs, climate change scenarios, and management strategy. The process itself demonstrates that a decision model can utilize climate and decision science to support action in the face of uncertain and changing information.