

In 2008, the U.S. Coral Reef Task Force launched a research initiative to address the effects of land management decisions on coastal resources in the Guánica Bay watershed. While municipal and agricultural growth in the Guánica area has provided social and economic value, it has also led to changes in biodiversity, altered the quantity and quality of available water, and increased effluent, sediment, and nutrient runoff reaching coastal coral reefs. As a result, locally important fishing and tourism economies have declined. The U.S. Environmental Protection Agency is currently applying a structured decision-making process to better understand stakeholder values and perceptions and to determine how proposed decision alternatives might support or conflict with different stakeholder objectives. This process incorporates proposed management actions from the Guánica Bay Watershed Management Plan developed by the Center for Watershed Protection, as part of the U.S. Coral Reef Task Force research initiative. The structured decision-making process considers how these proposed alternatives directly relate to coral reef protection and the broader decision landscape.

Bayesian networks (BNs) can integrate information related to a set of decisions, while factoring in uncertainty, to characterize how proposed decision alternatives might impact ecosystem service endpoints. Here, we describe how a BN was constructed within the broader context of the structured decision-making process. Using the example of two decision options (agricultural practice alteration and reservoir dredging) we show how decisions can be represented in the model to evaluate multiple endpoints (coral suitability, reservoir water yield, and soil loss). We also discuss ways the BN might be expanded and improved with information from ongoing work. This type of broadened assessment of management alternatives allows prioritizations or cost benefit analysis of management actions that better account for potential co-benefits and risks associated with the decision alternatives, and should ultimately lead to better decisions.