

Scale-dependent Methods to Manage Water Resource Systems for Ecological Integrity

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Water resource systems often contain numerous components that are intertwined or even contradictory, such as power production, water delivery, recreation, and environmental needs. It is important to manage these water resource systems for ecological health while also considering the tradeoffs or consequences of these management strategies. In addition, because many ecological processes depend on local- to basin-scale hydrogeomorphic conditions, the spatial scales at which these systems are analyzed also need to be considered. Water resource managers and scientists need tools that can explore the social-ecological interactions of management alternatives at different scales. Dr. Morrison addresses this need using a variety of methodologies to evaluate the ecological and human impacts of water management at a variety of spatial scales. He has developed unique methods to explore the social-ecological interactions at local landform scales (spatially-explicit Bayesian network model), river reach scales (stochastic system dynamics model), and basin scales (hydrogeomorphic floodplain delineation models). He has applied these methods at numerous locations across the United States, including the Gila River and Rio Chama, New Mexico, and the Wabash Basin in the midwestern U.S. These methods are useful for more thoroughly assessing the tradeoffs of management decisions, integrating water resource system components within a holistic framework, and evaluating ecological consequences of management scenarios at various spatial scales.