

Utility of Ecological Conceptual Models for Environmental Decision-Making

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The term *conceptual model* can be viewed as a set of qualitative or descriptive statements or hypotheses concerning the nature of causal relationships among human activities, the resulting anthropogenic stressors, and their impacts on human and ecological systems. Developing ecological conceptual models is an especially important initial step in understanding multiple stressors and cumulative ecological effects, as well as for assessing the ecological consequences of management alternatives at regional scales. This tool can then be used for a variety of assessment, management, and communications purposes. Included in the conceptual model development process are the following steps: identification of the ecosystems of concern, and their spatial, temporal, and ecological scales; identification of environmental goals and objectives for the ecosystems; development of an inventory of the human activities and associated natural and anthropogenic stressors potentially affecting the ecosystems; identification of pathways by which stressors may affect the ecosystem; identifying the receptors, i.e., the ecological components that may be exposed and thus at-risk to the stressors; selecting the specific ecological endpoints or valued ecosystem components of ecological and/or societal concern, providing the specific context to assess the significance of ecological effects; and creating a graphical representation of these elements illustrating the human activities and stressors, the pathways to effects on the valued ecological components, and weightings of important causal relationships. Examples will be given from specific environmental applications, including the regional Everglades and Apalachicola Bay ecosystems, for which ecological conceptual models have been developed as a tool for describing the causal relationship between land uses, stressors, at-risk valued ecological resources, and their associated ecological endpoints and measures.