



**Ecological Conceptual Models: A Framework and Case Study on Ecosystem Management for South Florida Sustainability.** J. H. Gentile, M. A. Harwell, and W. Cropper, C. C. Harwell, D. DeAngelis, S. Davis, J. C. Ogden , and D. Lirman. *Journal of Science and the Environment (accepted, in press)*.

The Everglades and South Florida ecosystems are the focus of national and international attention because of their current degraded and threatened state. Ecological risk assessment, sustainability, ecosystem and adaptive management principles and processes are being used nationally as a decision and policy framework for a variety of types of ecological assessments. The intent of this study is to demonstrate the application of these paradigms and principles at a regional scale. The effects-directed assessment approach used in this study consists of a retrospective, eco-epidemiological phase to determine the causes for the current conditions and a prospective predictive risk-based assessment using scenario analysis to evaluate future options. Imbedded in these assessment phases is a process that begins with the identification of goals and societal preferences, which are used in the development of an integrated suite of risk-based, policy relevant conceptual models. The development of regional scale conceptual models have raised several issues: delineation of the spatial boundaries; model connectivity; the development of meaningful societal/scientific dialogue in planning and goal setting; the degree of aggregation and dis-aggregation of the landscape specifically as it pertains to determining the appropriate hierarchy for ecological endpoints and measures; the importance of incorporating natural variability into measures of performance, and the clear linkage of management actions, sources (landuse and hydrology), stressors, and ecological endpoints and indicators.

Conceptual models are used to illustrate the linkages among management (societal) actions, environmental stressors, and societal and ecological effects and provide the basis for developing and testing causal hypotheses. These models, developed for a variety of landscape units and their drivers, stressors, and endpoints, are used to formulate hypotheses to explain historic, current, and future conditions. They are also used as the basis for structuring management scenarios and analyses to project the temporal and spatial magnitude of risk reduction and system recovery. Within the context of recovery, the conceptual models are used in the initial development of performance criteria for those stressors that are determined to be most important in shaping the landscape and to guide the use of numerical models used to develop quantitative performance criteria for scenario analyses. The results are discussed within an ecosystem and adaptive management framework that provides the foundation for decision-making.