

USEPA's Ecological Exposure Modeling Science: Frameworks, Components and the Emerging Community of Practice for Reuse

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Abstract

The Ecosystem Services Research Program of the EPA Office of Research and Development envisions a comprehensive theory and practice for characterizing, quantifying and valuing ecosystem services and their relationship to human well-being. This vision of future environmental decisionmaking is planned as an innovative, online decision support platform with a full range of data exploration methods and models connecting managers and policy developers with their ecosystems of interest, from local to regional and national scales.

Both systems thinking and integrated multi-disciplinary research are essential to program success. The interrelationships and interdependencies among the elements of ecosystem assessment aimed at the valuation of ecosystem services are far more complex than the straight-forward ecosystem type-service-value relationship typically used to describe such assessments.

Modeling plays a central role in formalizing scientific understanding and connecting monitoring data with a variety of approaches (e.g., statistical, mathematical, Bayesian) that describe system behavior and enable the forecasting of future ecosystem states for decisionmaking. To facilitate reuse and interoperability of data, methods and models within the wider environmental modeling community (EPA and beyond), scientific information and developed products will have a shared architecture. This makes it possible for data to inform model development and verification needs and for models to facilitate data needs across scales, filling gaps and providing information that cannot be cost-effectively sampled for a national program, for all services at all areas and times of interest.

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