A tiered, system-of-systems modeling framework for resolving complex socio-environmental policy issues

Nov 23, 2018

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Abstract

Many of the world’s greatest challenges are complex socio-environmental problems, often framed in terms of integrated assessment, resilience or sustainability. To resolve any of these challenges, it is essential to elicit and integrate knowledge across a range of systems, informing the design of solutions that take into account the complex and uncertain nature of the individual systems and their interrelationships. To meet this scientific challenge, we propose a tiered, system-of-systems, modeling framework with these elements: a component-based, software framework that couples a wide range of relevant systems using a modular, system-of-systems structure; a tiered structure with different levels of abstraction that spans bottom-up and top-down approaches; the ability to inform robust decisions in the face of deep uncertainty; and the systematic integration of multiple knowledge domains and disciplines. We illustrate the application of the framework, and identify research and education initiatives that are needed to facilitate its development and implementation.

Read the full article in Environmental Modelling and Software [1].

Associated Project:
Use of socio-environmental systems modeling in actionable science: State-of-the-art, open challenges and opportunities [2]

DOI for citing:
https://doi.org/10.1016/j.envsoft.2018.11.011

Source URL:

Links