A broadened view on the role for models in natural resource management: Implications for model development

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Abstract

Models play a central tool in the development and implementation of management strategies. In this paper we identify four major modeling purposes that are important for understanding and managing complex socio-environmental systems: prediction, exploratory analysis, communication and learning. Each of these purposes highlights different system characteristics, role of uncertainty, the properties of the model and its validation. We argue that uncertainty has no meaning in isolation, but only relative to a particular modeling activity and the purpose for which a model is developed (e.g., when a model is developed for predictive purposes uncertainty needs to be eliminated as much as possible, while when a model is developed for exploration uncertainty can be considered a source of creative thoughts). Here, we specifically investigate the implications different purposes have in dealing with uncertainties. We present a set of strategies modelers can use to guide their developments. In light of these concepts, the modeling activity is re-contextualized, from being a process that aims at representing objectively an external reality, to one that can only be defined according to the characteristics of the problem at hand: its level of complexity, the knowledge available, the purpose of the model and the modeling tools. We present an example from the adaptive management field.