Modeling Approaches for Predicting Climate Change Impacts on Natural Systems; From Inputs to Algorithms to Outputs and What They Can Tell Us

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The implications of present and future climatic changes for natural systems are becoming more and more important for scientists and natural resource managers to understand. For more than two decades a great deal of research has been done to predict what could happen to ecosystems as a result of changing climates. Many approaches have been taken, all varying in units of analysis, model inputs, algorithms, and outputs. In addition they also vary in scale, both temporally and spatially. Because of this the applicability and the interpretation of model predictions also differ. It is important to be aware of model assumptions and the sensitivity of some modeling approaches to model inputs. Though many modeling approaches have been criticized for their assumptions and omissions, they are still useful tools for directing future research and assessing a range of potential future changes. Each modeling approach's foundation is rooted in classical plant ecology theory; concepts of plant associations, individual biological potentialities, potential versus realized niches, ecological thresholds, and the temporal and spatial scale on which these operate. Close attention to the conceptual foundation on which the model was created will help determine how the results should be interpreted and how useful the model will be for answering a particular question at hand.

Kirsten Ironside is an ecologist at Northern Arizona University. She specializes in geographic information systems and their application to landscape ecology. Her research interests lie in paleoecological vegetation and climate change, historic vegetation patterns as a result of disturbance, climatic events, and succession, and how this information can be used for assessments of the future.