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Knowledge exchange for climate adaptation planning in western North America

Gregg Garfin (1) and Barron Orr (2,1)

(1) School of Natural Resources and the Environment, University of Arizona, Tucson, United States (gmgarfin@email.arizona.edu), (2) Department of Ecology, University of Alicante, Alicante, Spain

In western North America, the combination of sustained drought, rapid ecosystem changes, and land use changes associated with urban population growth has motivated concern among ecosystem managers about the implications of future climate changes for the landscapes which they manage. Through literature review, surveys, and workshop discussions, we assess the process of moving from concern, to planning, to action, with an emphasis on questions, such as: What are the roles of boundary organizations in facilitating knowledge exchange? Which practices lead to effective interactions between scientists, decision-makers, and knowledge brokers? While there is no "one size fits all" science communication method, the co-production of science and policy by research scientists, science translators, and decision-makers, as co-equals, is a resource intensive, but effective practice for moving adaptation planning forward. Constructive approaches make use of alliances with early adopters and opinion leaders, and make strong communication links between predictions, impacts and solutions. Resource managers need information on the basics of regional climate variability and global climate change, region-specific projections of climate changes and impacts, frank discussion of uncertainties, and opportunities for candid exploration of these topics with peers and subject experts. Research scientists play critical roles in adaptation planning discussions, because they assist resource managers in clarifying the cascade of interactions leading to potential impacts and, importantly, because decision-makers want to hear the information straight from the scientists conducting the research, which bolsters credibility. We find that uncertainty, formerly a topic to avoided, forms the foundation for constructive progress in adaptation planning. Candid exploration of the array of uncertainties, including those due to modeling, institutional, policy and economic factors, with practitioners, science translators, and subject experts, stimulates constructive thinking on adaptation strategies. Discussion support to explore multiple future scenarios and research nuances advances the discussion beyond "uncertainty paralysis."