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Stephanie Paladino

University of Oklahoma, Center for Applied Social Research, macypal@gmail.com

Jennifer Koch

University of Oklahoma, Department of Geography and Environmental Sustainability

Sophie Plassin

University of Oklahoma, Department of Geography and Environmental Sustainability

Jack R. Friedman

University of Oklahoma, Center for Applied Social Research

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What's an "actor"? What's a "system"? Breaking knowledge down to build it up again in collaborative socio-ecological modeling of the Rio Grande/Rio Bravo Basin.

Stephanie Paladino¹, Jennifer Koch², Sophie Plassin³, and Jack R. Friedman⁴

¹MeroLek Research (macypal@gmail.com); ²University of Oklahoma, Department of Geography and Environmental Sustainability (jakoch@ou.edu); ³University of Oklahoma, Department of Geography and Environmental Sustainability (sophie.plassin@ou.edu); ⁴University of Oklahoma, Center for Applied Social Research (jack.r.friedman@ou.edu).

Abstract: Environmental modeling of complex human-environment dynamics faces many challenges, including key conceptual and methodological questions of what to model, at what scale, and what constitutes relevant data or knowledge. Given this complexity, socio-ecological modeling increasingly calls for collaborations that bring together different knowledge sets, both multi-disciplinary and of the actors in the environment to be modeled. A key challenge, however, is that collaborators bring to the exercise different epistemological, methodological, and experiential frameworks. In addition, modeling platforms themselves impose particular structures on ways of knowing particular problems. To help advance socio-ecological modeling, we describe a collaborative process among social scientists and modelers to explore different water and land management scenarios in the transboundary Rio Grande/Rio Bravo (RGB) basin under changing climate conditions. After conducting extensive interviews with water managers throughout the basin to develop knowledge of key water management dynamics, modelers and anthropologists worked interactively to develop an agent based model (using the ENVISION platform) that integrates qualitative data with existing biophysical data. We describe key stages and challenges in this interactive process, including: clarifying conceptual and language differences; discovering what questions to ask each other in order to know what knowledge to share; reconciling integrative, ethnographic knowledge with the quantitative and disaggregative requirements of the modeling platform; and budgeting sufficient time for this mutual learning phase. We argue that the inclusion of an explicit, interactive mutual learning process is as important in the design of collaborative, cross-disciplinary environmental modeling projects as are the choices of data and modeling platforms.

Keywords: cross-disciplinary collaboration; socio-ecological modeling; agent based model; Rio Grande/Bravo; water management.