



WATER for the SEASONS

"A Program for Sustaining Water Resources in a Changing Climate"

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FS 16-04

Collaborative Modeling to Assess and Enhance Community Climate Resiliency

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Water for the Seasons partners scientists with community stakeholders in the Truckee-Carson River System to explore new strategies and solutions for dealing with extreme climate events such as droughts and floods. Funded by a grant from the National Science Foundation and the U.S. Department of Agriculture, this four-year research and outreach program uses a collaborative modeling methodology that strategically links scientific research with community problem-solving. The goal of this program is to assess and enhance community climate resiliency in snow-fed arid-land river systems. For more information, visit www.waterfortheseasons.com.

Introduction

Creating effective community responses to improve resilience to extreme climate events, such as prolonged drought, requires acknowledging and understanding the interaction between human and natural systems. Collaborative modeling is one way of inviting public participation into climate science research and encourages adaptation strategies at the watershed and community scale. This fact sheet outlines collaborative modeling, as one type of participatory research design, to assess and enhance climate resiliency, and describes best practices toward effective participatory research.

Why Link Research With Community Problem-Solving?

Historically, environmental policy relied on *basic* science research to forward scientific theory, the findings of which would presumably later be applied to real-world problem-solving. To avoid conflict, stakeholder values were separated intentionally from the resource problem to be studied.

For the past several decades, however, scientists, community decision-makers, policy makers and the general public have recognized that natural resource problems are inherently complex. These complexities

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include physical, social, cultural, spatial and temporal elements; thus a more inclusive research approach is needed (Cornell et al. 2013).

Climate change issues, in particular, have been described as ideal examples of these complex resource problems. These issues reflect the conflicts that can emerge from competing interests and values. Such complex problems cannot be resolved simply by applying the results generated from basic science research (Meadows et al. 2015).

Scientific experts and local stakeholders have determined that they must engage in effective dialogue about how to best study these problems in order to produce *useful* climate science and find effective, mutually satisfying solutions. The resulting climate science then reflects local knowledge and is readily applicable (Meadow et al. 2015). At the same time, scientists desire to reflect realistic human behavior and decision-making in their research in order to address real problems and forward climate science.

Collaborative Modeling as Participatory Research

To design effective dialogue involving stakeholders and scientists as an integral core component of research, well-structured public outreach and purposeful stakeholder participation is necessary. Since the 1970s, participatory research methods have evolved and provide useful guideposts from which to borrow tested principles and practices to provide coherent structure. These currently go by a number of names, including group model building, participatory action research, multi-

criteria/multi-decision-making and collaborative modeling, to name a few. Collaborative modeling is one way of engaging in participatory research to tackle complex resource problems. The basics of any participatory research design require effective relationship-building and communication skills involving scientist and stakeholder communities.

Best Practices

When asked, scientists and stakeholders may disagree as to what qualifies as *best practices*. However, increasing use of participatory research methods, such as collaborative modeling, has helped to establish some basic core concepts regarding best practices. The common thread running through these practices emphasizes mutual trust and respect. This practice applies to strengthening communication and relationships between scientists and stakeholders. The research activity should empower both through the cooperative act of participation (Langsdale et al., 2013).

The following best practices provide initial guidance to support effective collaborative modeling moving forward:

- Stakeholder participation is founded on a philosophy of stakeholder empowerment through trust, collaborative learning and fairness.
- Stakeholder participation occurs early and consistently throughout the research process.
- A situation assessment is necessary to evaluate the potential for participatory research and to identify stakeholders for involvement in long-term research goals and activities.

- At the outset, collaborative modeling must identify and establish clear objectives agreed upon by stakeholders.
- The kinds of participatory methods used can be selected and tailored to the program once identified stakeholders and scientists clarify and agree upon the desired research goals.
- Skilled facilitation is necessary to support effective interaction involving stakeholders and scientists.
- Local knowledge is highly valued by all participants and is integrated to the greatest extent possible.
- Evaluation of the collaborative modeling method and participatory process must occur consistently, and activities need to be modified accordingly (Butler & Adamowski, 2015).

Conclusion

While the objectively measured and documented outcomes and impacts of stakeholder participation remain few in number, evidence to date suggests that stakeholder participation can improve the quality of natural resource management decisions. Stakeholder participation must be founded upon a philosophy that emphasizes trust, empowerment and fairness. It must occur early on and consistently throughout the research process. While perceived as “risky” by both stakeholders and researchers, if well designed, carefully implemented, consistently evaluated and modified accordingly, collaborative modeling as a participatory research design has much to

offer in addressing complex natural resource problems stemming from climate change as evidenced at the community scale.

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