Engaging Future Vulnerability and Adaptation Using Landscape-scale Iterative Scenario-Building

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Abstract

Current projections of future climate change foretell a potentially calamitous ecological transformation that threatens populations around the world. Landscapes and communities in rural areas of the United States are already facing considerable impacts from anthropogenic climate change including altered fire regimes, more intense and prolonged drought, loss of snowpack, disease outbreaks, and numerous other hazardous threats. Evidently, there is an urgent need for adaptive practices that can promote more resilient ecosystems and communities and anticipate future change in these lands. A key component of rural adaptation is the assessment of both ecological and social vulnerability. In this presentation, we discuss recent applications of a novel assessment method in three diverse case studies.

The research featured in this presentation describes an innovative, interdisciplinary methodological technique for assessing future climate change vulnerability and adaptive capacity called Landscape-scale, Iterative Scenario-Building (LISB). Combining advances in qualitative scenario planning and participatory methods with theoretical approaches in political ecology and anthropology, the process was designed to permit dynamic interaction at multiple scales and across diverse constituencies and stakeholder groups. Moreover, through iterative reframing of down-scaled impact models of hydrological and ecological change and consequent adaptive actions, the research was designed to incorporate social-ecological feedbacks and path dependencies in order to more closely reflect ‘real’ world dynamics including learning.

This method was conducted in three diverse settings across the rural United States: 1) Big Hole Valley (Montana) 2) Grand County (Colorado), and 3) Appalachian foothill communities of southeast Ohio. Each of these cases represents a diverse set of socio-economic, cultural, and political dynamics as well as qualitatively different sets of relationships with the natural resources in their respective landscapes. Moreover, local manifestations of future climate change in these landscapes will likely be highly divergent. Utilizing hydrological and ecological models of local climate change, individuals and focus groups were presented with three diverse but highly possible narrative descriptions of climate change trajectories in their respective landscapes. Responses and proposed actions were re-incorporated into each scenario over two rounds. As we discuss in the presentation, researchers found highly varied impacts and responses across the cases. In exploring these vulnerabilities and capacities, we also discuss the differences between sites and across scenarios regarding risk perception,

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governance dynamics, place attachment, identity formation, and livelihood outcomes.

Comparison of the three case study sites demonstrates a number of beneficial elements to this methodology. Firstly, the scenario-building process enabled participants to pursue a future desirable state within certain parameters and in interaction with other social actors at various scales. This interaction permitted the identification of possible future disputes as well collaboration and constraints as well as opportunities. Moreover, through the iterative stages, we were able to identify key thresholds and regimes shifts, particularly surrounding those sets of social-ecological relationships of concern to these communities. Ultimately, we argue that by embracing a broader notion of socio-ecological systems that includes a deeper appreciation of political dynamics, locally situated knowledge, and uncertainty, researchers and communities can navigate the complex futures that climate change presents.

**Keywords:** Adaptive capacity, scenario analysis, local knowledge, threshold, sense of place, stakeholder engagement, political ecology, frameworks, governance