Developing social-ecological decision support tools for environmental flows management

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Abstract. Environmental flows is a research framework that aims to specify water quantity allocation in rivers to sustain ecological integrity and societal well-being. This goal challenges scientists and watershed managers to engage in interdisciplinary collaborative efforts, which includes evaluating socially responsible options for sustaining highly valued ecosystem conditions. Applications of environmental flows research that analyze a range of acceptable flow management options based on pre-enumerated objectives and social-ecological attributes are uncommon. We envision a flexible interdisciplinary framework for research among the ecological and social sciences toward enhancing the quality of making values-based decisions for freshwater allocation projects that have flow-related vulnerabilities. We present an environmental decision support system that aims to elucidate the feasibility of environmental flows management in complex social-ecological systems by developing user-driven decision support tools that elicit mathematical programming methods, the influence of stakeholder objectives or criteria, socioeconomic variables, and flow-related ecological variables. Our next steps are to collaborate with stakeholders in on-the-ground research projects that identify vulnerable social-ecological attributes and construct spatially-explicit decision support systems to aide in the evaluation of projects for environmental flows management.