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An Economic Evaluation of Peak Flow Management on the Rio Chama

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Abstract: The Rio Chama between the El Vado and Abiquiu reservoirs has no substantive consumptive flows. The economic value of this stretch of river is, instead, centered on instream flow values. Management of these flows to consider non-consumptive values (e.g., hydropower, recreational fishing and boating) has the potential to increase the economic value of the river. In addition, the economies of surrounding rural communities could greatly benefit from increased economic activity through improved outdoor recreation. The difficulty in assessing the efficacy of peak flow management is the complexity of the potential spatial and temporal tradeoffs between alternatives within the region, as well as any impacts downstream. We model the economic value of alternative management plans to assess the efficacy of alternatives, as well as the tradeoffs between plans. A catalog of the potential economic factors is developed that includes not only the activity, but also the spatial and temporal aspects of the factor. Benefit transfers are utilized from the extent literature in order to develop economic valuation models of alternative flow patterns. These models are incorporated into a system dynamics (SD) frame that also models the hydrology of the river. The SD modeling frame places considerable attention on the economic activity and the location of that activity, as well as the interactions between flow patterns and economic tradeoffs. This allows us to consider not only the overall impacts, but also the economic trade-offs both spatially and temporally. While the focus of this research is spatially limited, the techniques and modeling considerations provide a foundation that could be expanded to consider larger scale problems that may be increasingly complex due to international boundaries and regulations.

Keywords: environmental flows; system dynamics modelling; reservoir operations; hydropower production; economic valuation