

## **Evaluating groundwater management policies with an integrated hydrologic-economic model of the Republican River Basin**

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**Abstract.** Agriculture in the Republican River Basin of Colorado relies on groundwater extraction from the Ogallala aquifer to supplement sparse natural precipitation during growing seasons. These vital groundwater resources are becoming increasingly scarce as rates of extraction greatly exceed the natural rate of aquifer recharge. Efficient groundwater management policies are necessary to guarantee the sustainability of the aquifer and the future of the rural economies that rely on the Ogallala in Colorado. However, there exists little information regarding the long and short-term tradeoffs that exist between differing groundwater management policy measures. This presentation will explore how the short-term costs of groundwater conservation compare to long-term benefits across differing policy instruments utilizing an integrated, dynamic hydrologic-economic model. The model integrates an economic decision making framework of groundwater extraction for agricultural production with a hydrologic model to accurately portray the temporal dynamics of groundwater use in the basin. Model results under differing management policy scenarios are compared to explore policy efficacy as well as the spatial distribution of policy impacts throughout the basin. Results will inform the groundwater conservation policy debate currently underway in the basin, affording stakeholders more accurate information on the costs and benefits of differing policy options. Finally, the presentation will highlight the novel integration methodology utilized in the model to link economic decisions with the physical and temporal dynamics of groundwater.