



Jun 27th, 10:40 AM - 12:00 PM

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Mary Hill  
mchill@ku.edu

Hongyu Wu  
Kansas State University, hongyuwu@ksu.edu

Danny Rogers  
Kansas State University, drogers@ksu.edu

Johua Roundy  
University of Kansas, jkroundy@ku.edu

Robert Barron  
University of Kansas, rbarron@ku.edu

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Hill, Mary; Wu, Hongyu; Rogers, Danny; Roundy, Johua; and Barron, Robert, "Scientific Evaluations for Creative Solutions: The case of western Kansas Agriculture and a Proposed Water-Energy Trade" (2018). *International Congress on Environmental Modelling and Software*. 17.  
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## Scientific Evaluations for Creative Solutions: The case of western Kansas Agriculture and a Proposed Water-Energy Trade

**Mary C Hill<sup>a</sup>, Hongyu Wu<sup>b</sup>, Danny Rogers<sup>b</sup>, Joshua Roundy<sup>a</sup>, and Robert Barron<sup>c</sup>**

a. University of Kansas ([mchill@ku.edu](mailto:mchill@ku.edu), [jkroundy@ku.edu](mailto:jkroundy@ku.edu))

b. Kansas State University ([hongyuwu@ksu.edu](mailto:hongyuwu@ksu.edu), [drogers@ksu.edu](mailto:drogers@ksu.edu))

c. Western New England University ([robert.barron@wne.edu](mailto:robert.barron@wne.edu)) (formerly University of Kansas)

**Abstract:** Semi-arid dryland regions account for 40% of world agricultural areas. Many of these areas are facing difficult circumstances. The Ogallala aquifer in western Kansas is one example, with problems that are typical and data that is exceptional. Past agricultural and hydrologic data document how irrigation in western Kansas has produced a multi-billion-dollar agricultural economy that is now threatened by pumping-induced declines in groundwater levels. Reduced pumping could mitigate the threat and preserve much of Kansas' agricultural economy in the long term (albeit at a reduced level). A primary disincentive for reducing pumping is the immediate economic impact of diminished irrigation. A proposed state water-energy tradeoff program could reduce groundwater use while maintaining, and perhaps increasing, economic benefits. This program would allow development of the region's rich wind and solar energy resources in a way that focuses on local economic benefits, in exchange for water-right concessions from affected stakeholders. In considering this alternative, citizens need to address a key question, "What could this mean for me?" Answers require knowledge of interdependence between agriculture, energy, water, economics, droughts, and associated uncertainties, knowledge that is available at regional universities. This talk presents a joint University of Kansas – Kansas State University effort to address the scientific challenges and develop a quantitative decision support tool that accounts for uncertainty. Preliminary discussions with farmers suggest substantial interest in more locally beneficial energy production, and less interest in reduced water rights.

**Keywords:** Food-Energy-Water Nexus; arid lands; agriculture, science and policy; decision support