# **Modeling Water-Use Behavior Under Uncertainty**

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### Goals

- Model the existing system of day-today water use behavior in the Wasatch Range Metropolitan Area (WRMA)
- Examine how such behavior, as well as longer-term investments in water infrastructure, is impacted by increasing social and natural uncertainties about future water supply



Figure 1. Showing the impact of this year's drought on water levels in the providence reservoir.



#### **Applied Economics, Charles Sims**

## **Research Methodology**

A structured two-tiered approach using empirical models

- 1. Develop a basic conceptual agent-based model for short-term water-use decisions and a real-options model for the impacts of increased uncertainty on the decision to invest in water infrastructure in the WRMA
- 2. Incorporate natural science data into the human behavioral models via uncertainty considerations. For instance, stream flow data will be used to estimate trends and volatility in water supply compromising consumers' ability to receive predictable water supplies.



Figure 2. Emphasis on the inextricable linkage between natural and social science in water research.





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pility of Region's Water SUppl to respond to future water shocks and costraints

## Impact

- Establishing the status quo of water use and infrastructure investment in the region and how it is likely to respond to future uncertainties
- Improving understanding of how existing systems can best adapt to future constraints on water resources
- Serving as a bridge between the qualitative social science data on human behavior and quantitative natural science data

Porcupine Reservol

me Department, Department of Agriculture, and the newly formed Porcupine

he first Dam of its size in Utah, it called for one million cubic yards of earth fill and ontained 12,800 acre feet of water making possible the irrigation of 3,000 acres that

the fall of 1998, extensive renovations were begun in order to bring the reservoir

o to current state dam safety standards. The renovations were completed by ilbert Western Company of West Jordan, Utah in the spring of 1999 at a cost of

tion, 5.397 ft, crest of dam - 5,225 ft, base of dam

Figure 3. An example of investment in water infrastructure.

ad never before seen water.



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