

## **Decision Analysis with Geographically Varying Outcomes: Preference Models and Illustrative Applications**

### **Abstract**

*This paper presents decision analysis methodology for decisions based on data from geographic information systems. The consequences of a decision alternative are modeled as distributions of outcomes across a geographic region. We discuss conditions which may conform with the decision maker's preferences over a specified set of alternatives; then we present specific forms for value or utility functions that are implied by these conditions. Decisions in which there is certainty about the consequences resulting from each alternative are considered first; then probabilistic uncertainty about the consequences is included as an extension. The methodology is applied to two hypothetical urban planning decisions involving water use and temperature reduction in regional urban development, and fire coverage across a city. These examples illustrate the applicability of the approach and the insights that can be gained from using it.*