



Modeling Urban Water Use Under Climate Change in a Transitional Urban System, Phase I

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Goal

- Explore how population growth, urban form, water policies, and climate change affect urban water environment at multiscale levels in the Wasatch Range Metropolitan Area (WRMA)
- Develop a conceptual framework and modeling options representing the complex relationship between urban development and water resource management
- Investigate tools for integrated water-land modeling, and visualize different scenarios of urban growth under distinct water-sustainability emphasis and growth theories

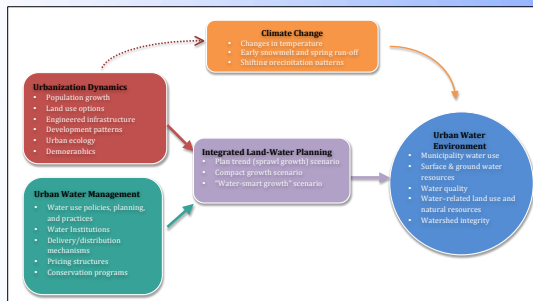


Figure 1. Integrated land-water planning & management

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Research Methodology

- SLEUTH, a cellular automata model, is adopted to simulate Cache County's urban growth and land use change from 1984 to 2030.
- Scenario One – "Sprawl Growth": growth will occur under current land use regulations and management plans, without any further restrictions.
- Scenario Two – "Compact Growth": grow with high density infill development and low rates conversion of greenfield-to-urban.
- Scenario Three - "Water-Smart Growth": growth with maximum potential to conserve water-related land resources and minimizes the amount of developed land.

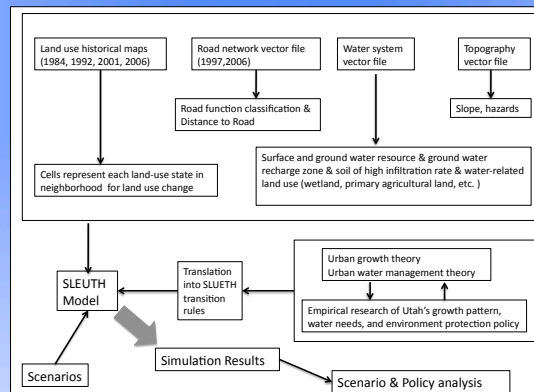


Figure 2. Model diagram

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Results

- Scenarios Simulation Results See Figure 3.
- Through comparing these scenarios and detecting the interactions between growth patterns and water use, water infiltration, and water runoff patterns in the urban environment, this study presents how different locality's comprehensive plans may contribute to the sustainability of growth, land use, and development in the context of watershed health, maintenance of ecosystem integrity, and water conservation.

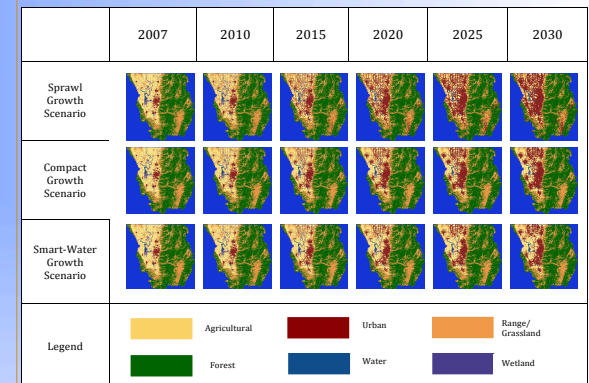


Figure 3. Urban Growth and Land Use Simulation Results



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