

Participatory Modeling and Planning for Sustainable Water Management in the Chicago Region

County and regional government agencies use stakeholder committees to ensure representation of diverse interests when planning, but these representatives are often not trained to understand the complexity inherent to human-environmental issues (e.g., groundwater management). Planning professionals use computer models to simulate the interaction effects of different plan-related policies, but most are “black boxes” to stakeholders, who are therefore forced to trust the simulations without understanding human-environmental complexity, reducing the opportunities for effective solution-building. Agent-based models can represent decisions and environmental dynamics in a rule-based form that invites non-expert users’ involvement in both developing the model and meaningfully interpreting its outputs. We will conduct a study of water resource planning in Northeast Illinois to examine how collective agent-based modeling contributes to participatory planning by increasing citizens’ understanding of the interaction effects of components of land and water use plans, and supporting joint collaboration around the implementation of the plan. Many areas outside Chicago are among the fastest growing in the US and rely solely on rapidly diminishing groundwater. Planning efforts in the region have developed general guidelines to protect water resources, but conflicts remain around their implementation. We expect that the social adoption of the model as a tool for participation will help resolve two key obstacles for plan implementation: 1) inadequate knowledge of the interaction effects in complex resource use, leading stakeholders to describe a too narrow and abstract set of effects tied to only one system component and stakeholder goal, and 2) conflicts among stakeholders that emerge from stakeholders’ perception that groundwater is an exclusive and fungible good they can possess, instead of a common and vulnerable good they need to share and adapt to. The research will thus contribute to scholarly knowledge regarding the role of agent-based modeling as a tool for participatory planning for complex environmental problems, and at the same time provide practical benefits to the region.