

## **ABSTRACT**

Purchasing land for the use of open space is crucial for municipalities who are concerned with land conservation and urban sprawl mitigation. Ecological contributions from natural resources add to the benefits of parcel purchase. Land resource quality can be quantified by overlaying ecological spatial data into a multiple criteria Geographic Information Science (GIS) environment. Each data input is assigned a level of priority decided upon by city planners. The parcel with greater than average natural resource further explains the priority of parcel acquisition for open space and the economic tradeoff under budget constraints. This research includes identifying future hot spots for land acquisition through an agent-based Modeling Open Space Acquisition (MOSA) model. MOSA is a scientific approach that assists in classifying the ecological resource value of available land for open space acquisition. Within the MOSA model data are ranked by weighted criteria across a sample area of interest. The weighted sum tool in MOSA considers wildlife habitat, agricultural lands, historical sites, recreation corridors, vegetation biodiversity, riparian wetlands, parcel proximity, parcel size, as parcel carrying capacity by weighted criteria. While other ecologically weighted models primarily use discrete vector data, shapes with defined boundaries, MOSA uses the grid value of raster data which is its equivalent in digital pixels. Each pixel in the raster data set represents 50 square feet in the sample area that numerically translate the parcel's ecological resource value. The MOSA model identifies areas of highly natural resourced land as supplemental evidence in quantifying or targeting and prioritizing parcel acquisition for open space preservation. Municipalities, counties, and government agencies can benefit from MOSA where land acquisition is evaluated from a scientific classification of natural resource capital. The ecological land value found in this study is of course highly sensitive, (if one considers their land more economically sound with the spatial information found within), and is intended for the sole purpose of quantifying land ecologically for the purpose of open space acquisition, preservation of public lands, and ultimately mitigating urban sprawl. This research includes sample areas of Boulder, Colorado as a case study.