

Scenario-based conservation modeling at Chicago's urban/rural fringe: land acquisition and management costs

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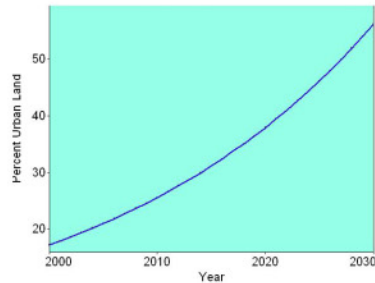
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Introduction

With the advent of agriculture, tallgrass prairie in Illinois was reduced from 60% to 0.04% of the states land cover. More recently, development pressures have caused rapid increases in agricultural land consumption and property values. Typical of counties on the fringe, Kane County, Illinois, currently has a program in place to purchase land for conservation, but it is important to understand fully the long-term costs associated with specific conservation goals.

Kane County information:

- Expected increase in developed land from 16% in 1998 to 52% in 2028
- Conservation acquisitions between 2000-2005 = 2225 hectares (growth scenario), compared to only 2800 hectares total prior to 2000



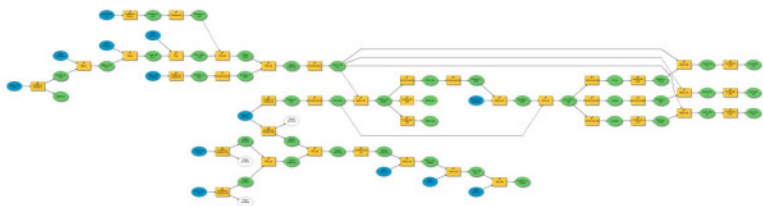
Objectives

The objectives of this project were to create a portable GIS model that would help to:

- Determine the amount of funding needed to maintain a conservation land-purchasing program under different scenarios.
- Identify differences in the geographic location of conservation land under different scenarios.
- Identify costs associated with prairie restoration and long-term maintenance of newly acquired conservation lands.

Methods

- Scenario-based approach to offer a wide range of possibilities for conservation planning.
 - Growth Scenario – Conservation goal of 2020 hectares per 5 years
 - Trend Scenario – Conservation goal of 1215 hectares per 5 years
 - Limited Scenario – Conservation goal of 405 hectares per 5 years
- Model design using ESRI ArcGIS and Modelbuilder for maximum portability.
- Urban growth and conservation suitability sub-models.



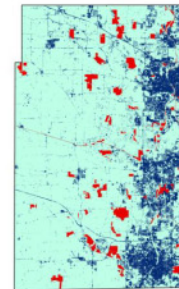
Modelbuilder Model with iterations at 15, 30 years

Results

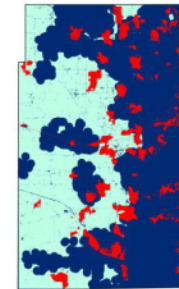
Land Acquisition

- Average cost per-hectare land purchased was \$54,000 (2000-2005)

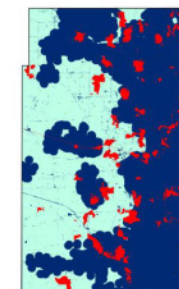
Scenario	Cost (per 5 year period)
Growth	\$110 Million
Trend	\$66 Million
Limited	\$22 Million



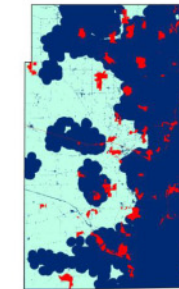
2005 Current Holdings



2030 Growth Scenario



2030 Trend Scenario



2030 Limited Scenario

Legend
■ Conservation Areas
■ Urban Area

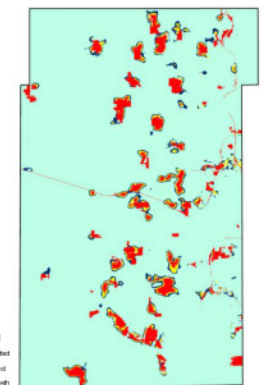
Long-Term Maintenance Costs

- Estimate of restoration costs for first 5 years = \$4200 per-hectare, includes field preparation, seed, 4 mowings, and 2 burns
- Maintenance after first 5 years = \$216.00 per-hectare, includes 1 burn and 1 mowing

Scenario	Cost (first 5 years)	Cost per 5 years thereafter
Growth	\$8.6 Million	\$440 Thousand
Trend	\$5.1 Million	\$260 Thousand
Limited	\$1.7 Million	\$170 Thousand

Future Work

- Additional iterations of model necessary to increase geographic accuracy, minimum 5 year intervals.
- More data or ground-truthing needed to fine-tune initial maintenance costs based on actual land cover.
- Expand work to include habitats other than prairie.
- Add detail to suitability model to focus for conservation of specific taxa.
- Determine regional differences in land costs and apply to scenarios for more spatially explicit cost representation.
- Parcel-based suitability analysis for conservation planning.



Legend
■ Limited
■ Trend
■ Growth

Overlap of 3 scenario outputs