

# Analysis of New York State Forests' Affect Upon Residential Property Values

Constructing a Viewshed Analysis Using ArcGIS ModelBuilder

A presentation of Master's Thesis Research  
Elysa Smigielski  
Nov. 13, 2013



STATE UNIVERSITY OF NEW YORK  
College of Environmental Science and Forestry

Research Question: Do property values increase  
when a neighboring State  
Forest is in view?

Study Area: Single Family Homes in Cortland, Tioga, and  
Tompkins Counties, NY

Conceptual Design

## Value of a Forest View

Poudyal, et al (2010) isolated the affects of forest views from the affects of views of other types of landscapes, to find that forest views are positively correlated with residential property values.

## Richness of View

Sander and Polasky (2009) calculated the percentage of different land cover classes within each view, to assess the affect of “richness of view”.

## Brief Review of the Literature

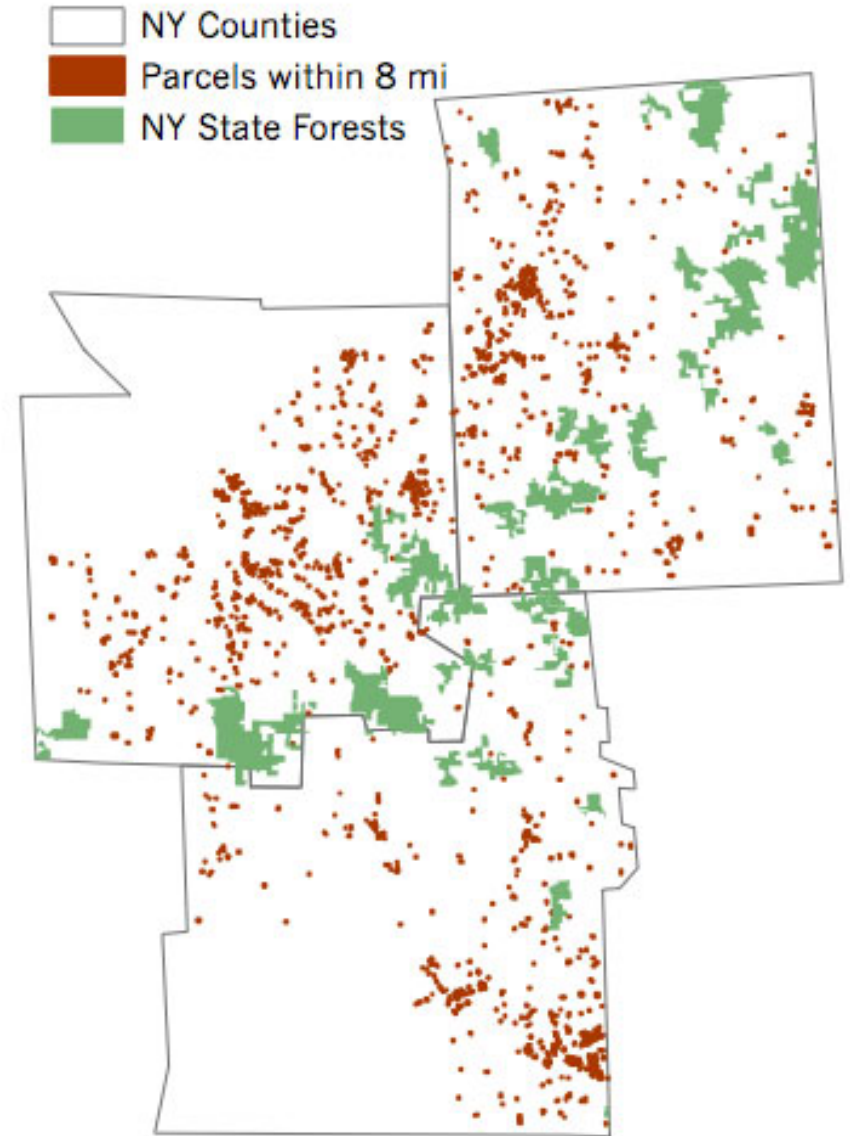
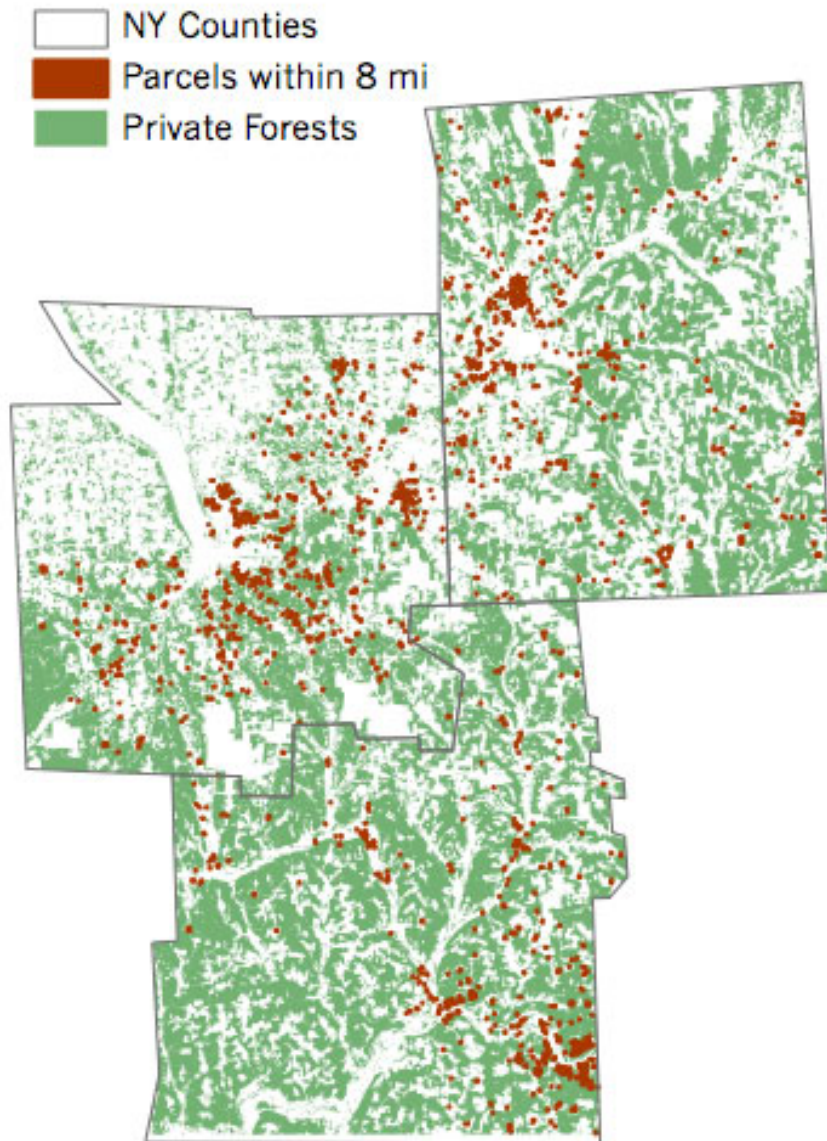
## Property Values

Cheshire and Sheppard (1993) state that housing is a composite and heterogeneous good, whose value is comprised of structural qualities, and location and accessibility to amenities.

## Location/Access

Thorsnes (2002, as cited in Cavailhes, 2009) found that property values increased with access to forests.

## Brief Review of the Literature



Conceptual Design - Study Area

**Part 1:** Construct a Viewshed Model that calculates the percentage of view (environmental variable)

**Part 2:** Use a statistical model to understand how each variable affects the selling price of a property

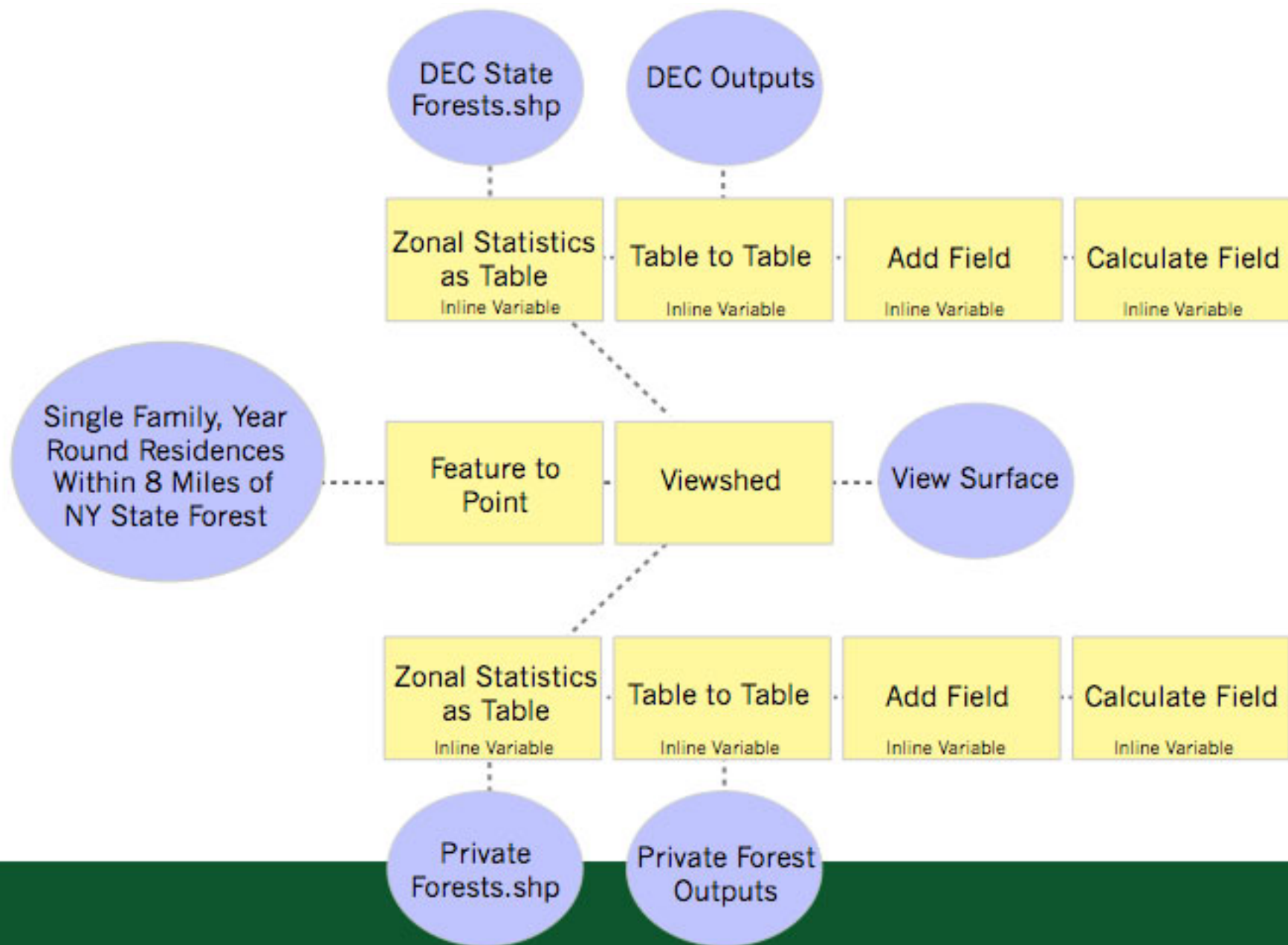
Model: Selling Price = Environmental + Structural+Neighborhood

Conceptual Design



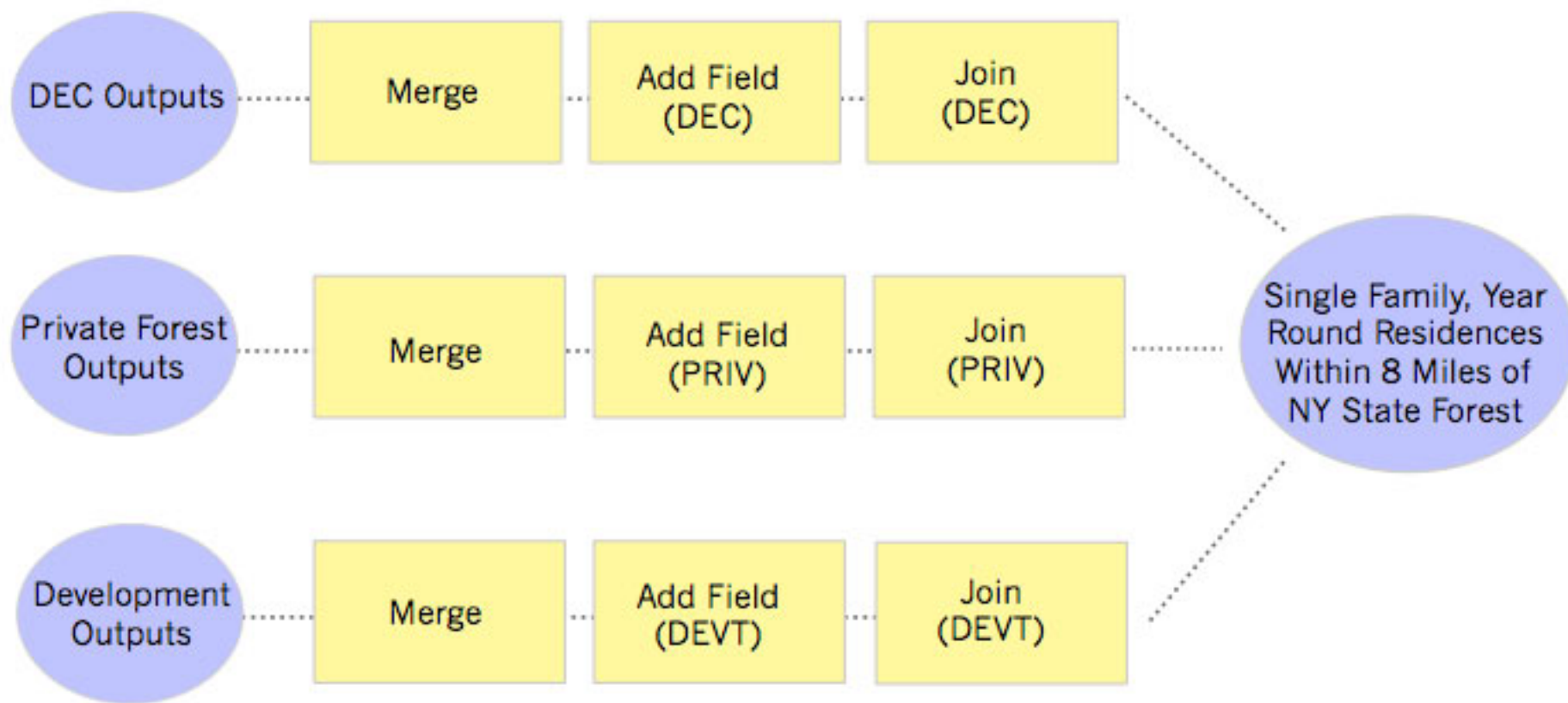


Distance of a View in Central NY = 8 miles



GIS Model





GIS Model

## Viewshed Outputs

Out of 1954 parcels:

508 have a view of a NY State Forests

1830 have a view of Private Forests

## Statistical Methods

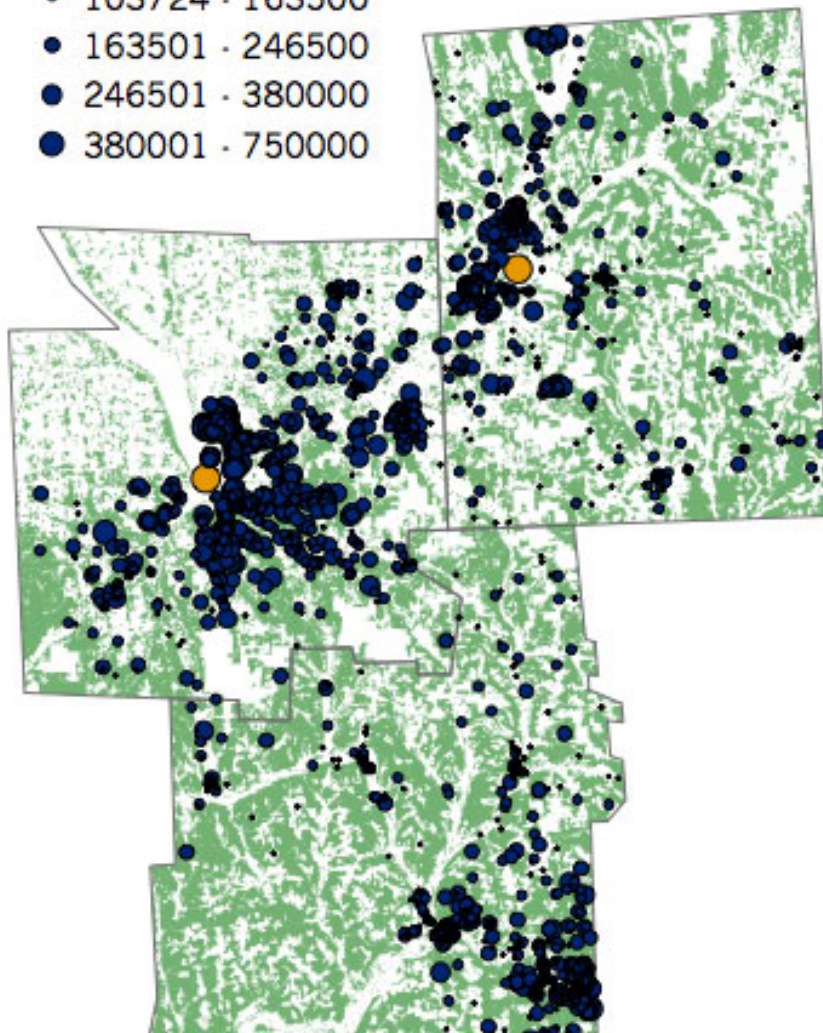
A preliminary test in ArcGIS with the OLS (ordinary least squares) tool showed that views of private forests were positively correlated with property values.

Results Thus Far

### Sale Price of Parcels with Views of Private Forests

- 40000 - 103723
- 103724 - 163500
- 163501 - 246500
- 246501 - 380000
- 380001 - 750000

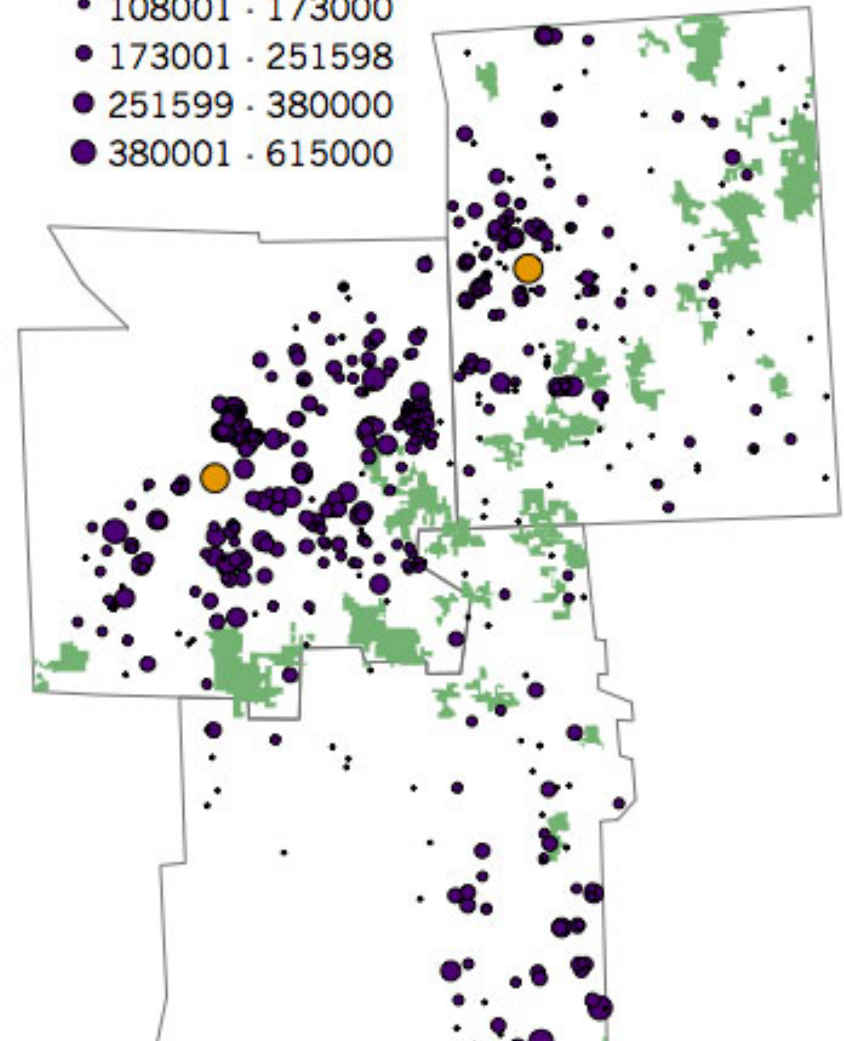
- Major Cities
- NY Counties
- Private Forests



### Sale Price of Parcels with Views of NY State Forests

- 40000 - 108000
- 108001 - 173000
- 173001 - 251598
- 251599 - 380000
- 380001 - 615000

- Major Cities
- NY Counties
- NY State Forests



Results Thus Far

### Parcel Data

Cortland County Parcel Data. 2012. Provided by Cortland County Planning.

Tioga County Parcel Data. 2012. Provided by Tioga County ITCS

Tompkins County Parcel Data. 2012. Provided by Tompkins County ITS.

### Rasters

Digital Elevation Model. National Elevation Dataset. Provided by The National Map Viewer, USGS <http://viewer.nationalmap.gov/viewer/>

Land Use Land Cover. 2006. The National Land Cover Database. Provided by The National Map Viewer, USGS <http://viewer.nationalmap.gov/viewer/>

### Forest Data

DEC Lands. New York State Department of Environmental Conservation, Bureau of State Land Management.

Data

- Adelaja, Adesoji et al. 2012. Drivers of Economic Performance in Michigan. Michigan State University Land Policy Institute.
- Bringham, Eugene. 1965. The Determinants of Residential Land Values. *Land Economics* 41:4 pp 325-334
- Cardozo, Daniel Osvaldo et al. 2012. Application of Geographically Weighted Regression to the direct forecasting of transit ridership at station level. *Applied Geography* 34. 548 – 558.
- Cavailles, Jean, et al. 2009. GIS Based Hedonic Pricing of Landscape. *Environ Resource Econ.* 44:571-590.
- Cheshire, Paul and Stephen Sheppard. 1993. On the Price of Land and the Value of Amenities. *Economica.* 62, 247-67
- Cho, Seong-Hoon et al. 2006. Measuring the Contribution of Water and Green Space Amenities to Housing Values: An Application and Comparison of Spatially Weighted Hedonic Models. *Journal of Agricultural and Resource Economics* 31:3 p 485
- DEC. Central New York: Region 7. <http://www.dec.ny.gov/outdoor/7792.html>
- ESRI. 2012. ArcGIS Resource Center: Regression Analysis Basics. ESRI.<http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#//005p00000023000000>
- Irwin, Elena. 2002. The Effects of Open Space on Residential Property Values. *Land Economics* 78:4. 465-480
- Kim, Yeon-Su and Rebecca Johnson. 2002. The Impact of Forests and Forest Management on Neighboring Property Values. *Society and Natural Resources* 15:887-901.
- Knapp, Gerrit. 1998. The Determinants of Residential Property Values: Implications for Metropolitan Planning. *Journal of Planning Literature* 12:3
- Mittal, Jay. 2011. Measuring the Externality Benefits of Voluntarily Protected Properties on Surrounding Home Values. University of Cincinnati.
- Poudyal, Neelam et al. 2010. Realizing the Economic Value of a Forested Landscape in a Viewshed. *Southern Journal of Applied Forestry.* 34:2. Accessed via ProQuest Central.
- Sander, Heather and Stephen Polasky. 2009. The value of views and open space: estimates from a hedonic pricing model for Ramsey County, Minnesota. *Land Use Policy* 26.
- Tyravainen, Liisa, and Antti Miettinen. 2000. Property Prices and Urban Forest Amenities. *Environmental Economics and Management* 39, 205-223.
- US Census Bureau. Tompkins County NY. <http://quickfacts.census.gov/qfd/states/36/36109.html>
- US Census Bureau. Cortland County NY. <http://quickfacts.census.gov/qfd/states/36/36023.html>
- Voith, Richard. 1991. Transportation, Sorting, and House Values. *AREUEA Journal* 19:2
- Zhang, Lianjun and Haijin Shi. 2004. Local Modeling of Tree Growth by Geographically Weighted Regression. *Forest Science* 50:2.

## Works Cited