Measuring the Impact of Greenway Infrastructure: Evidence on Heterogeneous Demand for Environmental Amenities

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Project Goals

- Measure greenway values in a first stage hedonic framework

- Test for heterogeneous values across the population

- Explore feasibility as a dissertation topic
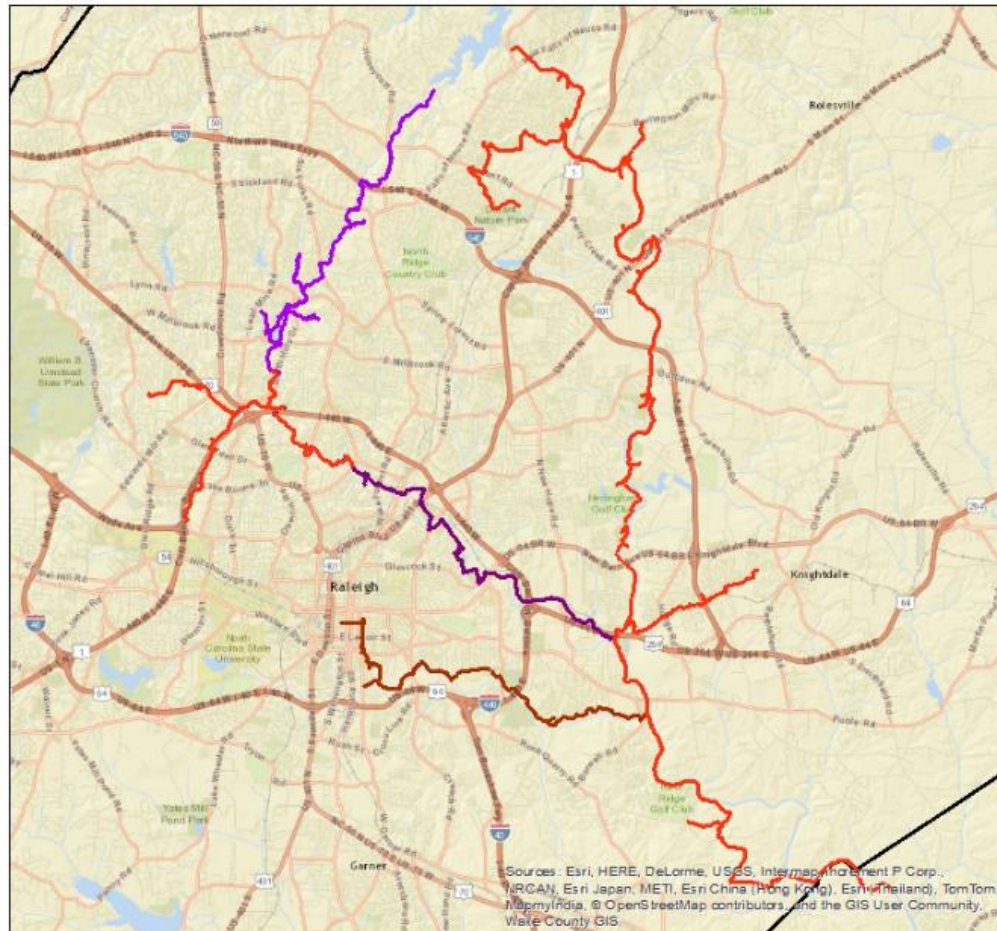
What is a Greenway?

- In short, a linear park
- Built along rivers, streams, abandoned rail corridor etc.
- Connect parks and other areas of interest
- Viewed as an environmental amenity and thought to attract residents

Section of the Neuse River greenway in southern Wake County, NC

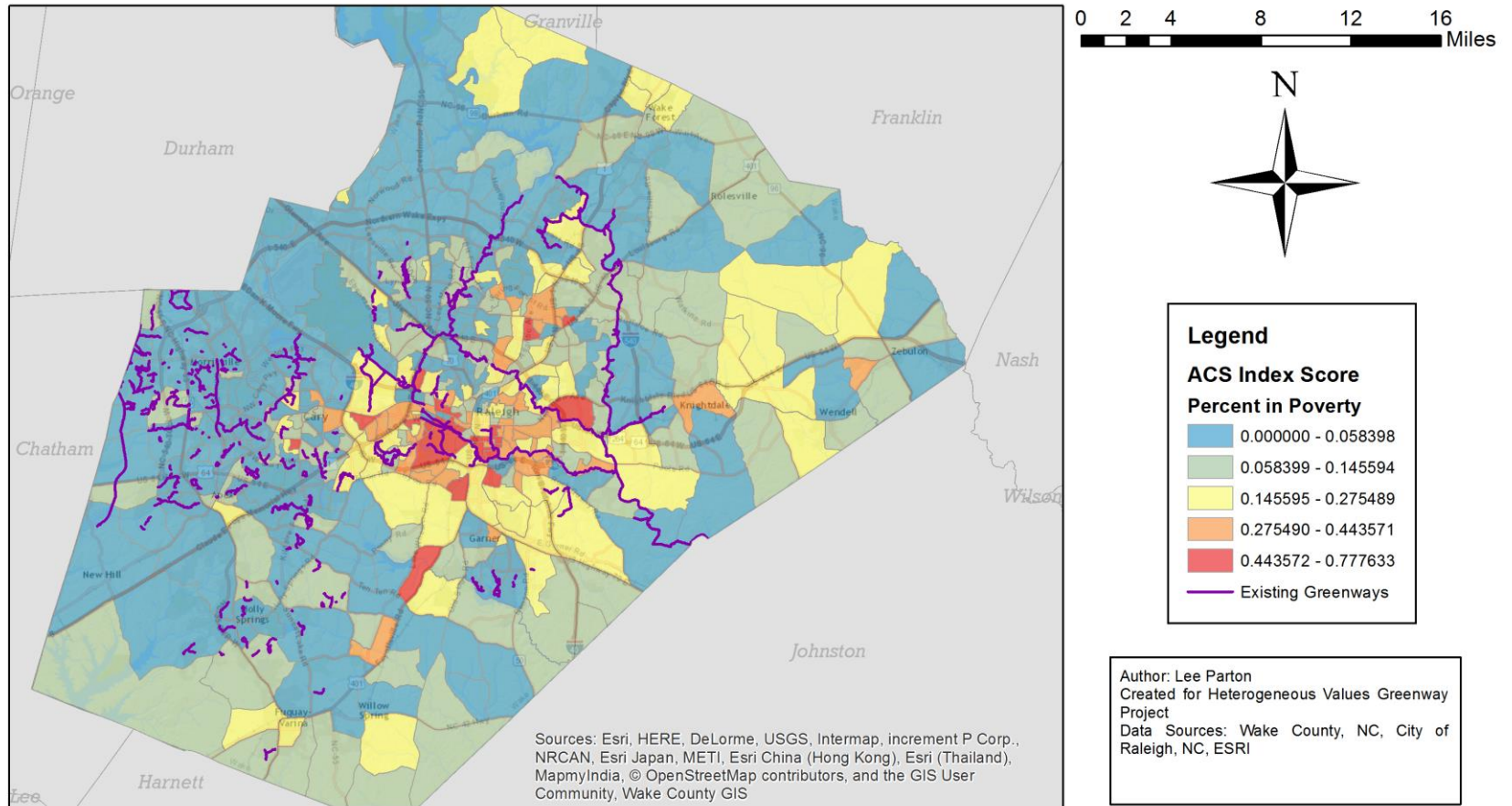# Greenway Expansion
2010-2015

Present

Data

- Structural and property characteristics for all parcels in Wake County 2005-2015

- Real Estate transaction data for 2006-2015

- Euclidian distance measured from every parcel to every greenway

- Demographic data at the census block group level

- Timing of greenway construction

- Greenway characteristics

Demographics

Methods

- Temporal fixed effects model with greenway timing
  - $\log(p_{it}) = \alpha + \beta\, X_{it} + \sum_{\tau=2006}^{2015} \psi_\tau Y_{it}^\tau + \sum_{j=1}^{16} \sum_{k=1}^{K-1} \theta_{kj} d_{it}^k +$
    $\sum_{m=2}^{455} \phi_m BG_{it}^m + \sum_{k=1}^{K-1} \sum_{j=1}^{16} \xi_{jk} d_{ijt}^k E_{jt} + \epsilon_{it}$
  - X_{it} = Structural characteristics for *i*th sale in time *t*
  - d_{it}^k = *i*th sale distance to nearest greenway at time *t*
  - BG_{it}^m = Census Block Group *m* in which sale *i* occurred in time *t*
  - Y_{it}^τ = Temporal fixed effect
  - E_{jt} = Denotes greenway existing at time of sale

Amenity Values in Low Income Areas

Variable	Trail 1		Trail 2		Trail 6		Trail 7	
	Pre-Trail Value	Post-Trail Δ Value	Pre-Trail Value	Post-Trail Δ Value	Pre-Trail Value	Post-Trail Δ Value	Pre-Trail Value	Post-Trail Δ Value
0-500 ft	0.000384	0.0419**	-0.0865***	-0.0174	-0.0363**	0.0075	-0.0840***	0.0513*
500-1000 ft	-0.0211*	0.0454*	-0.0847***	0.0446**	-0.0561***	0.0146	-0.0737***	0.0807**
1000-2000 ft	-0.0486***	0.106***	-0.0248	0.0448**	-0.0630***	0.0319***	-0.0889***	0.00233
2000-3000 ft	-0.0691***	-0.00796	-0.0745***	0.0311	-0.0237**	0.00057	-0.0683***	0.0122
3000-4000 ft	-0.0716***	0.0901*	0.00663	0.0278	0.0106	0.00851	-0.0718***	-0.0136
4000-5000 ft	-0.0279***	0.101***	0.0188	0.0346**	0.0148*	0.0207	-0.0220**	-0.0109

Negative amenity value :
Positive amenity value :
Significance level at the 1%, 5% and 10% levels denoted by ***, **, and * respectively

Amenity Values in High Income Areas

Variable	Trail 3		Trail 4		Trail 8		Trail 9	
	Pre-Trail Value	Post-Trail Δ Value	Pre-Trail Value	Post-Trail Δ Value	Pre-Trail Value	Post-Trail Δ Value	Pre-Trail Value	Post-Trail Δ Value
0-500 ft	0.130***	-0.0334	-0.0199	-0.0059	0.183***	-0.0573	0.0134	-0.0678
500-1000 ft	0.0886***	0.00413	0.00483	0.006	0.0248	0.0874**	0.0810***	-0.0138
1000-2000 ft	0.0631***	-0.0610**	-0.0306	0.00368	-0.118***	0.0184	0.0490***	-0.00613
2000-3000 ft	0.0227*	-0.0173	-0.0517**	0.0446***	-0.0703***	0.0132	0.0379***	0.0250*
3000-4000 ft	0.0589***	-0.0340*	-0.0175	0.0261	-0.0157	0.0252	0.0157	0.0700***
4000-5000 ft	0.0437***	-0.00687	0.0014	0.0282	-0.0369***	-0.00396	-0.00116	0.0862***

Negative ameinty value : 🟧   Significance level at the 1%, 5% and 10% levels denoted by
Positive amenity value   : 🟩   ***, **, and * respectively

Conclusion

- Evidence of heterogeneous valuation

- Greenways as disamenity mitigation?

- Evidence is limited for greenway amenity values in high income areas

- Estimating lower bound on values
  - Excludes values to residents that do not live near greenways
  - Excludes non-use values

- Decision makers may want to consider heterogeneous values when choosing greenway sites
  - Potential to increase tax revenues

Future Extensions

- Control for Crime
- Control for flood plains
- Move to a second hedonic stage analysis
  - Requires identifying separate markets or imposing structure
- Panel data hedonic framework using aggregated block group observations.
- Incorporate social networking data i.e., Strava and Map My Run, to develop travel cost measures.