Exurban Settlement Pattern and the Exurban Condition: A Typology of US Metropolitan Areas


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Motivation

- Little is documented
  - Too rural for urban researchers
  - Too urban for rural researchers
- Exurbanization is the trend
- Need to situate exurbia in the urban system
- Must be able to measure exurban pattern and understand the qualities and processes associated with exurbanization leads to better evaluation of impacts and more informed planning and policy decision
Research Objectives

- Measure exurban pattern as a whole in the metro area landscape
- Examine variation of exurban pattern across the US
- Develop a typology of exurban pattern by US metro area
- Provide profiles of the exurban metro types
Method

- **Define Study Area**
- Classification of landscape
- Cluster MSAs according to composition of exurban pattern
- Created profiles for each cluster using metro-level characteristics
Study Areas

- Lower 48 states
- 356 Metropolitan Statistical Area
  - minus the Urbanized Areas
- Minus federal land and major water bodies
Study Areas – Blue is the Exurban Field (where exurban development can take place)
Method

- Define Study Area
- Classification of landscape
- Cluster MSAs according to composition of exurban pattern
- Created profiles for each cluster using metro-level characteristics
Classification of the Landscape

- Parse the “exurban field” into different settlement types using the Landscan database (Oakridge Laboratory)
- Isolate the exurban settlement type in the exurban field
- Classify all exurban settlement cells into a pattern type
## Settlement Types

- **Using Landscan 2004 (Oakridge Laboratory)**
  - Raster-based population distribution model
  - 30” by 30” resolution

<table>
<thead>
<tr>
<th>Settlement Type</th>
<th>People/sq. mi.</th>
<th>Approx. Ave. Lot Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Urban and Suburban</td>
<td>1000+</td>
<td>&lt; 1.65 acres</td>
</tr>
<tr>
<td>Medium-Exurbia</td>
<td>100-1000</td>
<td>1.6 – 16.5 acres</td>
</tr>
<tr>
<td>Low-Emerging Exurbia</td>
<td>10-100</td>
<td>16 – 165 acres</td>
</tr>
<tr>
<td>Very Low-Rural</td>
<td>0-10</td>
<td>165+ acres</td>
</tr>
</tbody>
</table>
Settlement Types - Atlanta, GA
Isolate Exurban Settlement in the Exurban Field

1. Delineate the Exurban Field

2. Classify Settlement Types

3. Isolate Exurban Settlement
Classify each exurban settlement raster cell into a pattern type

3 qualities of pattern (spatial arrangement, contiguity to more dense development and size) that result in 10 unique pattern types

<table>
<thead>
<tr>
<th>Spatial Arrangement</th>
<th>Single</th>
<th>Linear</th>
<th>Clump</th>
</tr>
</thead>
<tbody>
<tr>
<td>isolated from development</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>contiguous to development</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

- small Relative to MSA
- large Relative to MSA
Shapes and Contiguity

- Linear, contiguous
- Single
- Non-contiguous
- Clumped
- Non-contiguous

Urbanized Area
Exurban Pattern by MSA
by Census Region

- Midwest
- Northeast
- West
- South

- single, isolated
- linear, isolated
- clump, isolated
- single contiguous
- linear, contiguous
- clump, contiguous

Graph showing the exurban pattern distribution across different Census regions.
Method

- Define Study Area
- Classification of landscape
- Cluster MSAs according to composition of exurban pattern
- Created profiles for each cluster using metro-level characteristics
Cluster MSAs according to composition of exurban pattern

- Cluster by minimizing variation within groups using standardized variables using hierarchical clustering in SPSS
  - Total metro area population
  - Exurban development
    - Total amount
    - Percent of each pattern type

- Selected the most efficient and descriptive number of clusters
Exurban Types

- Below Average Exurbia
  - Dispersed, Isolated and Linear
  - Contiguous, Average Pattern
- Average Exurban Pattern, Low Pop.
- Average Exurban Pattern, High Pop.
- Nearly Unbound Exurbia
- Unbound Contiguous Exurbia
- High Amenities, Low Exurbanization
- Dispersed Exurbia

Map of the United States showing various types of exurban regions.
Method

- Define Study Area
- Classification of landscape
- Cluster MSAs according to composition of exurban pattern
- Created profiles for each cluster using metro-level characteristics
Metro-level Processes and Characteristics Associated w/Exurban Growth

- Population dynamics
- Regional infrastructure and urban form
- Governance
- Amenities
- New Economy
- Regional variation
Profile – Below Average Exurbia – Dispersed, Isolated and Linear

Poster Child – Elizabethtown, KY (44)

- 9,372 square kilometers
- highest average dispersed exurbia - almost fifty percent the exurban settlement is isolated
- lower than average amount of exurbia
- smallest urbanized areas and the lowest urbanized areas population
- higher than average exurban/urbanized area ratio
- shorter commutes on average
- lowest average household income
- lower number of local governments
- second lowest percentage of employment in finance, insurance and real estate and the lowest percentage of professional and management jobs.

www.elizabethtownky.org
Profile – Below Average Exurbia – Contiguous, Average Pattern

Poster Child – Niles--Benton Harbor, MI (27)
7,519 square kilometers

- lower average amount of exurbia like previous type and higher than average exurban/urbanized area
- below average urban area size, population, and population density
- below average income
- lowest percentage of employment in finance, insurance and real estate and the second lowest percentage of professional and management jobs.
- high percent of jobs near the CBD
- major differences between this type and the previous type is that Below Average Exurbia, Contiguous has a higher metropolitan population and a more contiguous exurban form

http://www.nilesmi.com/
Profile – Average Exurban Pattern - Low Population

Poster Child – Santa Cruz, CA (57)

- 12,764 square kilometers
- most near the national average pattern
- lower than average exurban settlement per metropolitan at 224 square kilometers
- ranks just below average in most of the regional characteristics, such as income, and employment in professional and management position and finance, insurance and real estate
- lower population on average and lower urbanized population, which are its main distinctions from the next type

http://www.ci.santa-cruz.ca.us/
Profile – Average Exurban Pattern – High Population

Poster Child – Savannah, GA (71)

- near average pattern – more isolated than previous type
- higher amount of total exurbia, higher average exurban settlement per metropolitan area and a much higher urbanized area population, and a higher average number of governments than previous type
- highest average population density of urbanized areas of any type
- average population and income

http://www.savannah-visit.com/
Profile – Nearly Unbound Exurbia

Poster Child – Decatur, AL (104)

- 74,389 square kilometers
- average amount of exurban settlement by metropolitan area is high
- higher than average of clumped contiguous exurbia
- highest average urban area population and number of local governments
- higher than average metropolitan area population and commuting
- very little employment, relative to the other types, within a mile of the CBD
- second to Unbound Contiguous Exurbia, this type has high percentage of jobs in professional and management, and finance, insurance and real estate

http://www.digitaldecatur.com/
Profile – Unbound Contiguous Exurbia

Poster Child – Worcester, MA (30)

- 37,038 square kilometers
- highest average amount of exurbia by metropolitan area
- exhibits a regional trend
- most unlike ave. pattern - dominated by continuous exurbia
- highest 2000 metropolitan population and the largest urbanized areas
- much lower exurban area/urbanized area ratio at 8.08
- highest commuting and the least amount of jobs within one miles of the CBD
- highest percentage of professional and management jobs and finance, insurance and real estate jobs
- highest household income
- second highest number of governments

http://www.ci.worcester.ma.us/
Profile – High Amenities – Low Exurbanization

Poster Child – Palm Bay, FL (16)

- regional trend - concentrating in the south
- most single and linear settlement pattern
- smallest exurban footprint when compared to urbanized area size, at 5.24
- second smallest average exurban footprint by metropolitan
- highest amenity indexes, driven by water and winter temperatures

http://www.palmbayflorida.org/
Profile – Dispersed Exurbia

Poster Child – St. Cloud (7)

- regional trend grouped mostly in the upper north central
- almost all of the 3,097 sq. km. of this pattern is clumped - roughly 35% in isolated clumps
- smaller urbanized areas on average
- but the highest exurban/urbanized area ratio, at 19.22,
- much lower percentage of jobs close to the CBD
- higher income when compared to other types
- lowest percent of employment in professional and management positions
- a higher number of local governments

http://ci.stcloud.mn.us/Web/cityview1.jpg
## Significant Variables Associated with Differing Types

<table>
<thead>
<tr>
<th>Below Average Exurbia, Dispersed, Isolated and Linear</th>
<th>Average Exurbia, Low Pop</th>
<th>Average Exurban Pattern, High Pop</th>
<th>Nearly Unbound Contiguous Exurbia</th>
<th>Unbound Contiguous Exurbia</th>
<th>High Amenities, Low Exurbanization, Dispersed, Clumped Exurbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>metropolitan statistical area population, 2000</td>
<td>167,013</td>
<td>219,652</td>
<td>254,015</td>
<td>768,797</td>
<td>1,059,127</td>
</tr>
<tr>
<td>urbanized area size, sq. mi.</td>
<td>76</td>
<td>230</td>
<td>212</td>
<td>200</td>
<td>444</td>
</tr>
<tr>
<td>urbanized area population, 2000</td>
<td>113,960</td>
<td>138,111</td>
<td>180,993</td>
<td>604,206</td>
<td>913,189</td>
</tr>
<tr>
<td>urbanized area density, people/sq. mi.</td>
<td>1,854</td>
<td>1,784</td>
<td>2,202</td>
<td>2,563</td>
<td>2,050</td>
</tr>
<tr>
<td>exurban area/urbanized area ratio</td>
<td>9.57</td>
<td>9.86</td>
<td>8.57</td>
<td>8.32</td>
<td>9.36</td>
</tr>
<tr>
<td>average household income</td>
<td>48,133</td>
<td>50,291</td>
<td>49,785</td>
<td>51,244</td>
<td>52,491</td>
</tr>
<tr>
<td>% employment w/in 1 mi. of the central business district</td>
<td><strong>9.77</strong></td>
<td><strong>30.33</strong></td>
<td><strong>22.86</strong></td>
<td><strong>18.72</strong></td>
<td><strong>15.19</strong></td>
</tr>
<tr>
<td>% with commute greater than 30 minutes</td>
<td>21.62</td>
<td>23.36</td>
<td>24.94</td>
<td>24.06</td>
<td>29.22</td>
</tr>
<tr>
<td>% total employment in professional and management</td>
<td>10.76</td>
<td>10.94</td>
<td>10.69</td>
<td>12.50</td>
<td>13.51</td>
</tr>
<tr>
<td>% total employment in finance, insurance, and real estate</td>
<td>8.32</td>
<td>7.22</td>
<td>8.20</td>
<td>9.22</td>
<td>8.92</td>
</tr>
<tr>
<td>number local governments</td>
<td>33</td>
<td>37</td>
<td>38</td>
<td>83</td>
<td>102</td>
</tr>
<tr>
<td>amenity index - January temp</td>
<td>-0.48</td>
<td>0.13</td>
<td>0.05</td>
<td>-0.07</td>
<td>-0.04</td>
</tr>
<tr>
<td>amenity index - water</td>
<td>0.42</td>
<td>0.45</td>
<td>0.17</td>
<td>0.23</td>
<td>0.43</td>
</tr>
</tbody>
</table>

*Note: Bold values indicate the lowest values for each category.*
Conclusion

- Exurbia is a part of the urban system
- Suggestion of a continuum of exurban, but not a trajectory
- Redefine how we compare/contrast metro areas
  - Our over-emphasis of census regions
- Missing important metro-level processes
Sign up here for the latest info from the project.

http://exurban.osu.edu

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