Tracking Tree Canopy Cover Change in Worcester’s Greendale and Burncoat Neighborhoods

1952-2008

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Introduction

The city of Worcester, Massachusetts, witnessed rapid deindustrialization, urban flight, and substantial suburban growth over the last fifty years. However, little research has considered historic urban tree canopy change in addition to the anthropogenic effects that cause it. This study addresses the following question: How has urban tree canopy cover changed in northern Worcester between 1952-2008, and which socio-economic and biophysical forces have caused change? This area went through extensive urban flight during the 1960s and 1970s, and saw the construction of scores of single-family homes. The F4 tornado (1953) and subsequent tree planting along major streets also likely played a strong role in tree cover change and the relationship that residents have with urban trees. This project examines the change in tree canopy cover between 1952 and 2008 in the Greendale and Burncoat neighborhoods.

Study Area

The study area is focused on two of the three neighborhoods at Worcester’s northern end, Greendale and Burncoat. These neighborhoods are defined by the Norton/Saint Gobain plant along the western edge and forested areas to the east with residential areas through the center.

Research Objectives

This research examines the change in tree canopy in Worcester’s Greendale and Burncoat neighborhoods using historical aerial photographs

• How has urban tree canopy cover changed in northern Worcester?
• Which land use types have had the highest percentage canopy cover change, and why?
• What socio-political changes have influenced tree canopy cover change?

Methods

Pre-processing

• Geo-referenced aerial images of study area
• Used approximately 20 reference points per image with an RMSE around 4
• Created mosaic dataset, and clipped and stitched images together
• Color balancing

Identify tree canopy cover

• Identified trees based on their shape and size from images using the edit tool
• Dissolve all tree canopy cover polygons to avoid double-counting polygons

Results

Table 1 Canopy Cover Area Results

<table>
<thead>
<tr>
<th>Neighborhood</th>
<th>1952 Canopy Cover Area</th>
<th>2008 Canopy Cover Area</th>
<th>Percent Canopy Cover 1952</th>
<th>Percent Canopy Cover 2008</th>
<th>Percent Canopy Change 1952-2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greendale</td>
<td>1.36 km²</td>
<td>1.12 km²</td>
<td>15.10%</td>
<td>28.28%</td>
<td>13.18%</td>
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<tr>
<td>Burncoat</td>
<td>1.23 km²</td>
<td>2.09 km²</td>
<td>21.15%</td>
<td>47.99%</td>
<td>26.84%</td>
</tr>
<tr>
<td>Total</td>
<td>2.59 km²</td>
<td>3.21 km²</td>
<td>20.25%</td>
<td>46.27%</td>
<td>26.02%</td>
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Figure 1: Tree Canopy Distribution

Figure 2: Tree canopy loss and gain in the area around Quinsigamond Community College, by the intersections of West Boylston Street and Marland Road

1952 Tree Canopy Cover: Then Assumption College

Figure 3: Land Use Change Results

Figure 4: Canopy Cover Loss on Acushnet Ave in Burncoat

Land-Use Change

While most areas undergoing urban expansion and development experience deforestation to an appreciable degree, the northern neighborhoods of Worcester, Burncoat and Greendale saw a noticeable growth in tree canopy cover between 1952 and 2008. In fact tree canopy more than doubled over this time period. Out of these two neighborhoods, Burncoat experienced the most growth due to its transition from agriculture and open land to single-family residential developments as people planted trees on their properties. While in other cases suburbanization results in a loss of tree canopy from a forested landscape, this area of Worcester saw a large increase in canopy cover. An example of this can clearly be seen in Figure 4, with a noticeable increase in tree canopy as this area transformed. 100% of the agricultural land (pasture and cropland) was lost in this time period. This agricultural land was primarily replaced by both forest and urban developments, resulting the aforementioned tree canopy gain.

Summary

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