Introduction

Green infrastructure increases vegetation growth

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Project in collaboration with Tom Meixner and Tyson Swetnam

Methods

1) Created canopy height models for 2005, 2008 and 2015 using lidar data
   • Created digital elevation model (DEM) and digital terrain model (DTM)
   • Subtracted DEMs from DTMs to create canopy height models (CHM)

2) Identified boundaries for areas with and without green infrastructure
   • Identified locations of GI for both washes using GPS coordinates
   • Created rectangular regions 50 feet thick and the length of the street block where GI is located.
   • Used same approach as GI boundaries except shifted locations 1 to 2 streets over from GI. Areas chosen based on environmental similarities to GI regions.

3) Determined change in canopy height for each time interval by subtracting the canopy height model of the earlier year from later year

4) Compared changes in canopy height for regions with and without GI
   • Used QGIS Zonal Statistics to determine mean change in canopy height within each bounded region
   • Conducted two sample t-test to determine if significant difference existed

Results

Table 1: Average Canopy Height within Bronx Wash by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Regions with GI</th>
<th>Regions with No GI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>4.80 ± 1.17</td>
<td>3.80 ± 0.97</td>
</tr>
<tr>
<td>2008</td>
<td>5.40 ± 1.25</td>
<td>4.40 ± 1.00</td>
</tr>
<tr>
<td>2015</td>
<td>6.00 ± 1.30</td>
<td>5.00 ± 1.10</td>
</tr>
</tbody>
</table>

Table 2: Average Canopy Height within High School Wash by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Regions with GI</th>
<th>Regions with No GI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>3.90 ± 1.05</td>
<td>2.90 ± 0.85</td>
</tr>
<tr>
<td>2008</td>
<td>4.50 ± 1.12</td>
<td>3.50 ± 0.98</td>
</tr>
<tr>
<td>2015</td>
<td>5.10 ± 1.20</td>
<td>4.10 ± 1.06</td>
</tr>
</tbody>
</table>

Figure 8. Average Change in Canopy Height for Regions With and Without Green Infrastructure within Bronx Wash from 2005-2015

Figure 9. Average Change in Canopy Height for Regions With and Without Green Infrastructure within High School Wash from 2005-2015

Conclusions

Tree growth and loss are seen for regions with and without GI within both Bronx and High School washes. However, greater amounts of tree growth are seen compared to tree loss for both regions. Larger growth measurements are seen more frequently for regions with GI compared to regions without (Figures 5 and 6).

After performing statistical analysis, tree growth proved to be significantly higher for regions with GI only within High School Wash. The GI within High School Wash was installed before the GI within Bronx Wash. It is likely that this had an impact on the results of this project because the GI within High School Wash had a longer amount of time to provide a positive impact on the surrounding vegetation.

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References


