Using i-Tree Canopy to Assess 6 Major Olmsted Parks for Canopy Cover & Plantable Space

Michael Sawyer

ITA 2020

13 May 2020

Introduction

Over the years, urban forestry has rapidly grown as a discipline within the field of traditional forestry. This is because landowners, forestry professionals, and key decision makers are beginning to understand the host of benefits that urban vegetation provides, both to people and to the environment. Trees perform several environmental services, such as removing air and water pollution, sequestering carbon, and producing oxygen. In addition, access to urban trees contributes to human health & well-being by providing shade on a hot summer day, giving people a place to relax, and according to some studies, even contribute to faster hospital recovery times for some patients (Johnson, n.d). With growing concern over how anthropogenic activity is increasing the greenhouse effect and thereby accelerating climate change, people are beginning to learn and acknowledge that urban trees can be utilized as a cost-effective, efficient tool for combating the greenhouse effect. In order to secure adequate funding for tree plantings, maintenance, and removals, tools have been developed that use scientific parameters along with economic estimates to place a dollar value on the benefits that urban trees provide to cities and by extension, the planet as a whole. Such programs also estimate many of the environmental services provided by trees that were previously discussed (i.e. – carbon sequestration, air pollution removal, etc.). One tool used to perform this kind of analysis is a state-of-the-art, peer reviewed software suite known as i-Tree. The i-Tree program was developed by the USDA Forest Service, in conjunction with numerous cooperators like the Davey Tree Expert Company, National Arbor Day Foundation, and the International Society of Arboriculture.

The objective of this study is to perform a groundcover analysis of the six major parks within the Buffalo Olmsted Park system, located in Buffalo, NY using a program known as i-Tree Canopy. This analysis will utilize aerial imagery, user-defined cover classes, and statistical

tools provided by i-Tree Canopy to determine percent canopy cover and percent plantable turf for each park. The results of this study will be useful for professionals working at the Buffalo Olmsted Parks Conservancy (BOPC), as well as intrigued local landowners looking to gain a better understanding of how the trees in their area are providing benefits for them. The park identified as having the most plantable space and lowest existing canopy cover can be prioritized over other parks with regards to tree planting initiatives. As a non-profit working with a limited budget, it is important for BOPC to strategically focus planting efforts where they will reap the most benefits and have a significant impact on the landscape.

Methods

The first step of this project was to use the aerial imagery provided in i-Tree Canopy to define the project area boundary for each park. After the project area was defined, the next step was to create the cover classes. For this study, nine cover classes were created (Building, Impervious, Pervious, Soil/Bare Ground, Turf-plantable, Turf-non-plantable, Tree, Water, Other) For further description of each cover class, please refer to the "Cover Assessment and Tree Benefits Report" generated for each park. Such level of detail could be useful in future studies, that may seek to analyze overall pervious vs impervious ground cover within each park, or the system as a whole. However, for the purposes of this study, the cover classes of interest were Turf-plantable & Tree (canopy). After the cover classes were defined, the program then prompts the user to define the economic estimates by selecting the state, county, and area (rural vs urban) that the project is occurring in. Then, i-Tree Canopy prompts the user to review Google Maps aerial photography at random points to conduct a cover assessment within the defined project area. At least 500 survey points were completed for each park in order to produce a statistically valid result with low standard error ($\leq$2%). After the survey was completed, i-Tree Canopy

generates a report, showing both percent cover and area (ac) cover for each cover class. In addition, the program estimates various carbon, hydrological, and air pollution benefits associated with the tree cover for each park. The reports were analyzed and stratified from highest percent plantable turf to lowest percent plantable turf.

Results

Delaware Park is the largest of the six major parks, with an estimated area of 364 acres. Based off of i-Tree Canopy estimates, roughly 21% of Delaware Park is covered with trees and roughly 25% of the land is available for tree plantings (~90 acres). Front Park is the smallest of the major parks, with an estimated area of 25 acres. According to Canopy estimates, only 16% of Front park is covered with trees and nearly 43% of the land is available for tree plantings (~11 acres).

Discussion / Recommendations

Due to the ~90 acres of plantable land available, Delaware Park has the greatest capacity for new plantings. However, due to the large size of the park, it would take a substantial planting effort to have a noticeable impact on the landscape or to significantly enhance the environmental services provided by that park. MLK Jr. Park contains roughly 42% plantable land, similar to that of Front, but contains more trees. Therefore, it is highly recommended that future tree plantings be placed in Front Park. Front Park has the smallest estimated area, the lowest number of trees, and highest percent plantable area. This indicates that of all the parks, Front Park has the greatest potential for future development. Due to it's small size and low number of trees, even just a handful of plantings in this park would have a significant impact on the landscape, greatly enhance it's productivity and with time, allow the park to contribute more environmental

services to the city of Buffalo. According to the monetary estimates associated with air pollution removal benefits, Delaware Park is the most valuable park in the system, providing nearly $36,000 worth of air pollution removal / year. Efforts should be made to regularly maintain and if possible, enhance the current productivity of Delaware Park.

Conclusion

The park trees in the city of Buffalo perform a variety of environmental services that are useful for the community and wildlife alike. In addition to providing habitat for wild animals, urban trees also help mitigate air and water pollution by trapping air-borne particles such as pollen and by reducing overland rain flow during storm events. One overlooked benefit of urban trees is their effects on human health. The obvious ways trees achieve this benefit is by changing air quality but it has also been shown that people's bodies tend to relax and have a positive response to viewing vegetation such as trees (Nowak, 2012). For this reason, it is important that both tree professionals and common landowners strive to maintain and/or enhance their urban forest cover so that these benefits can continue to be received in the future.

Planting trees and allowing natural regeneration to occur are two great ways that any community member can contribute to the maintenance of their urban forest. More importantly, it is crucial that people learn to understand what their forest is and what services it provides so that with time, urban foresters can better manage this beautiful, dynamic system that we live within (Nowak, 2012). Through the use of i-Tree software, some benefits, such as carbon storage and air pollution removal, have been quantified. Additionally, various percent ground covers have been determined using random sampling statistics. These results will be useful for community members and local decision makers in the City of Buffalo and will ultimately help more informed management decisions to be made in the future.

Literature Cited

Johnson, Craig. “Benefits of Urban Trees.” Culver City Going Green. 1-5. Web. 13 May. 2020.

Nowak, David. “Living on Earth: Urban Forests.” Interview by Bruce Gellerman. *Living on Earth*. Living on Earth, 9 Mar. 2012. Web. 13 May. 2020. http://www.loe.org/shows/segments.html?programID=12-P13-00010&segmentID=6