

Tree Susceptibility Assessment

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Cambridge Massachusetts is a city and major suburb in the Greater Boston Area that has over 19,000 trees (Cambridge, 2011). The importance of inner cities trees has generated interest in recent years, due to their environmental benefit and growing susceptibility over recent years. Foran, Baker, Narcisi, and Linkov (2015) conducted an susceptibility assessment of urban trees in Cambridge. Their goal was to highlight the susceptibility of tree species in Cambridge due to a range of environmental factors (i.e. floods, wind, snow, pest infestation), as well as a forecast of loss due to climate change. Their study indicates factors of risks for different tree species in Cambridge, such as tolerability of trees to flooding, heat stress, size of the tree, and tolerance to other environmental factors.

The goal of the present analysis is to show the trees in areas of gain, loss, and no loss in Cambridge Massachusetts via a longitudinal analysis. As well, the purpose of this study is to display a map of high risk trees, and low risk trees based on criteria indicated by Foran, Baker, Narcisi, and Linkov (2015). The final product will likely result in a series of 2-3 map displays.

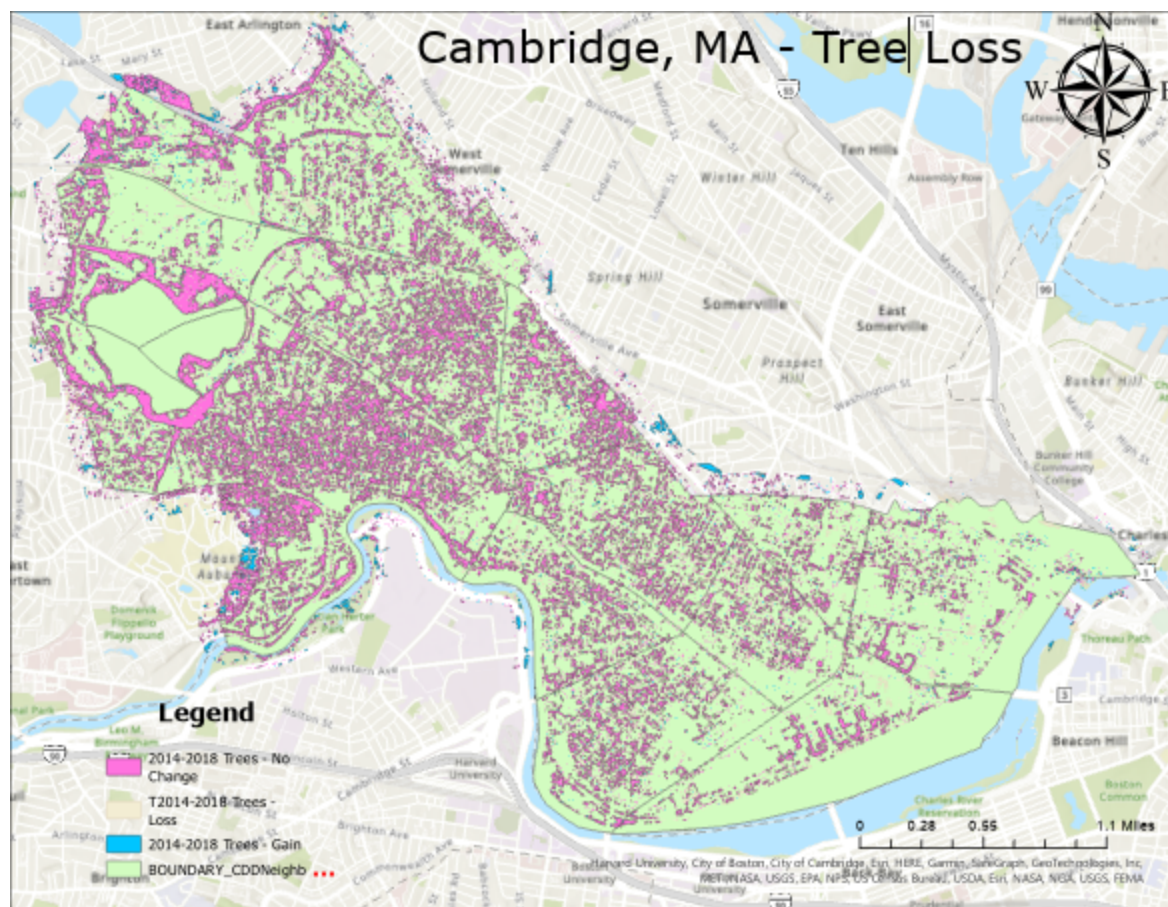
Method

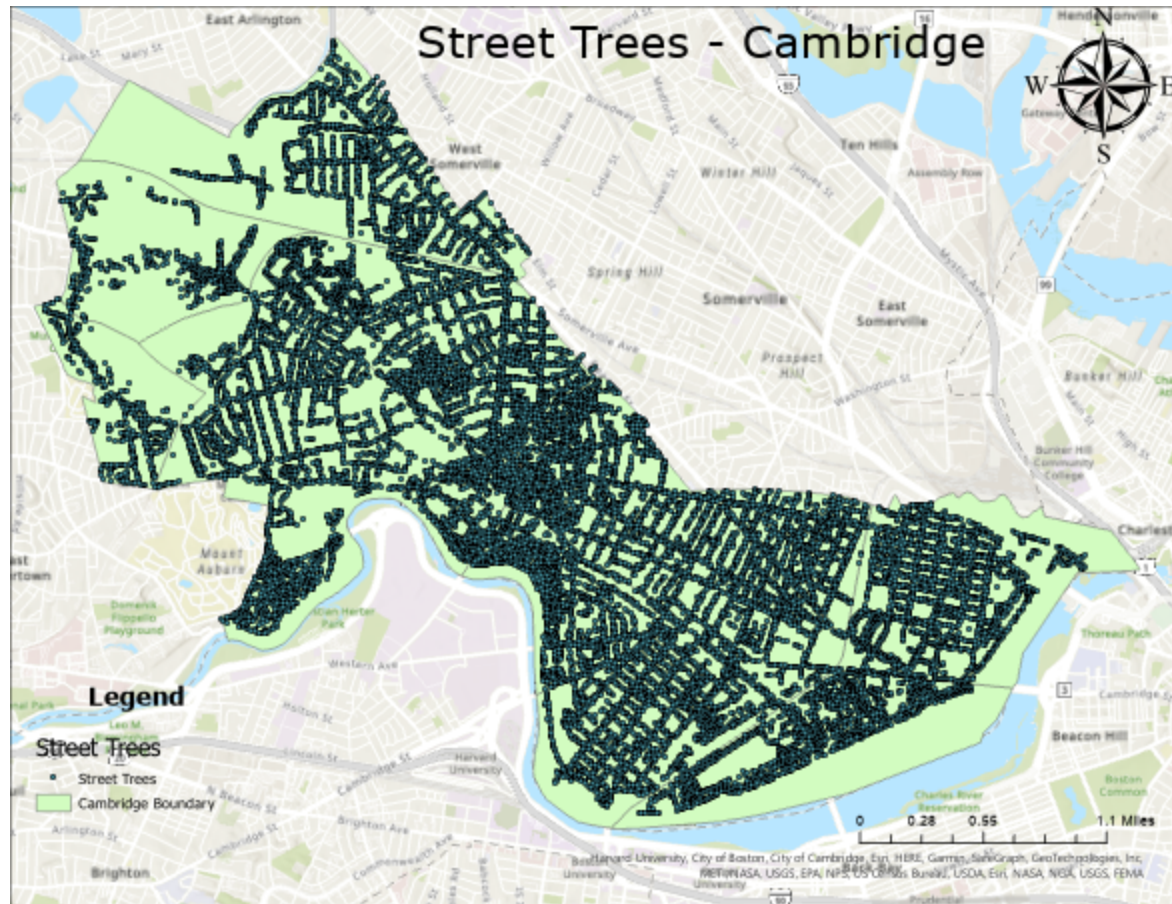
ArcGIS data is available via The City of Cambridge website, which includes GIS layers for trees, as well as tree canopy loss for intervals of time (i.e. 2009-2014; 2014-2018), political and spatial boundary layers, and a range of other data that can be used and manipulated in ArcGIS (Cambridge 2023). These data will be included in the current study. To generate an analysis of at-risk trees, tree species and their susceptibilities will be cataloged from the Foran, Baker, Narcisi, and Linkov (2015). The “DPW_StreetTrees” data layer includes a list of all street trees in the city of Cambridge, as well as columns indicating their size, diameter, species, root

exposure and other factors. They've also made available tree canopy loss from 2014-2018, which will also be included here.

First, the street tree data will be clipped with the tree canopy loss data to indicate types of trees that are found in the areas of loss, gain, and no loss for the available canopy loss of 2014. Further, criteria will be used to determine high and low risk trees (or trees susceptible to and tolerant of environmental factors) using selection and clip data in ArcGIS. The final display will show these tree categories, their location, and proximity to loss and gain areas in Cambridge MA.

Data	Link	Description	Source	Timeline
Street Trees	Street Trees	Shapefile containing trees and tree planting locations made available by the City of Cambridge. It lists the organizations involved in the data collection/ maintenance, including MIT.	City of Cambridge Website (see link)	This data source is presently available and current. They are presently uploaded and usable in my arcGIS project.
Tree Canopy Loss 2014-2018	Canopy Loss	Shapefile containing data on tree canopy change from the years of 2014-2018, made available by the city of Cambridge.	City of Cambridge Website (see link)	This data source is presently available and current. They are presently uploaded and usable in my arcGIS project.
City Boundaries (Cambridge)	City Boundary	Shapefile containing the political boundaries of Cambridge, made available by the city itself.	City of Cambridge Website (see link)	This data source is presently available and current. They are presently uploaded and usable in my arcGIS project.





References:

Cambridge (2011) The trees of the city of Cambridge: an analysis of the City's street and park trees. Retrieved 12 Mar 2023 from <http://www.cambridgema.gov/theworks/ourservices/urbanforestry/treeinventory.aspx>

Cambridge (2023) Retrieved 12 Mar 2023 from <http://www.cambridgema.gov/gis.aspx>

Foran, C. M., Baker, K. M., Narcisi, M. J., & Linkov, I. (2015). Susceptibility assessment of urban tree species in Cambridge, MA, from future climatic extremes. *Environment Systems and Decisions*, 35, 389-400.

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