Tree Planting Location Services

Location analysis of potential planting space for urban forests in Austin, TX

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Introduction

The Austin area is one of the fastest growing metropolitan areas in America, growing in population by almost 30% from 2010 to 2019 (U.S. Census Bureau, 2020). As Austin continues growing its ecological footprint will also grow with it, presenting its city planners and policymakers with an opportunity to work towards lowering both the city's carbon emissions and its urban heat island score, while also ensuring environmental equity to its residents.

Background

Tree Planting Location Services (TPLS) was commissioned by Alan Halter and the City of Austin Urban Forestry Program to update the existing community tree priority areas map by finding all of the available space within Austin's city limits that could be used for planting new trees, as of May 2021. TPLS conducted this research by using GIS to remove the currently existing canopy, impervious cover, surface water, and other areas that cannot be used for planting, leaving behind only the areas that could potentially be used for tree planting. The resulting map will be used in conjunction with demographic data and urban heat island scores associated with each census tract in Austin to help city planners and policymakers understand which parts of Austin are of highest priority for planting new trees.

The Plantable Surface Area of Austin's Full Watershed Regulation Area

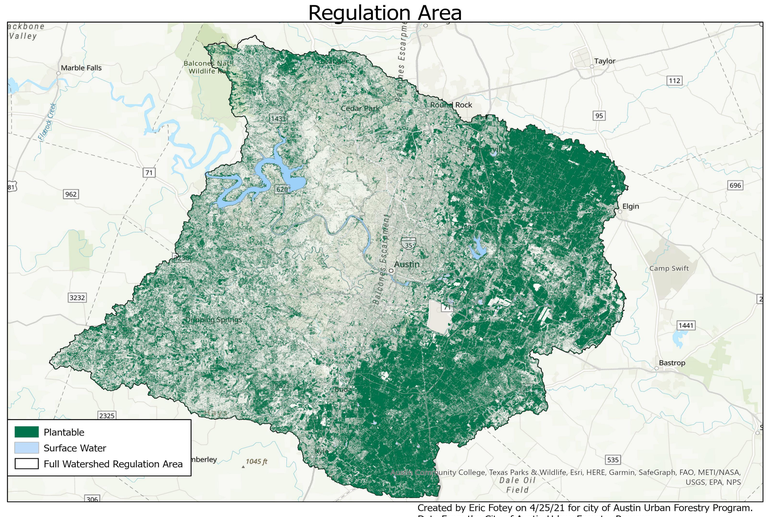

Figure 1

Created by Eric Fotey on 4/25/21 for city of Austin Urban Forestry Program.
Data From the City of Austin Urban Forestry Program.
NAD 1983 StatePlane Texas Central FIPS 4203

Data

Provided by Austins Urban Forestry Department we were given data that provide the following.

Tree Canopy – indicates the area in which trees have already been planted.

Impervious Cover- is the area that is not available for tree planting, such as concrete, roads, and buildings.

Surface Water- all streams, rivers, and lakes in Austin

Watershed Regulation area– the full watershed area that the city of Austin has the power to regulate.

Austin City Limits- provides the limited area that Austin city government has jurisdiction over.

Community Tree Priority Area – relays demographic data from Austin's census tract. This data was given from the Urban Forestry Program

Methodology

We started out the project by having to convert all the data the client provided to us into a vector. We needed to clip the impervious surface cover to the full watershed regulation area (our study area), because it had included a larger section of Central Texas previously. Then we merged all of the unplantable data together and ran the less than tool, but the less than tool didn't give us the exact output we wanted, it gave us 1, and 0, we wanted 0 but there was nothing showing for 0, so in order to get 0 to show up we had to run the raster calculator tool. In raster calculator we input

ConWe then simply had to Set null to 1 (which was nonplantable) and we were just left with everything plantable except the surface water. To remove the surface water layer we had to reclassify the surface water layer to 0 and reclassify the plantable and NODATA to 1. After doing this we were able to multiply the plantable layer by the surface water layer giving us the plantable layer without the surface water. For the analysis we first had to intersect the plantable layer with the census tracts layer and dissolve. Once the dissolve finished we added a new field and used calculate geometry to find the area of plantable space within each census tract. Then we divided the area of the census tract by the plantable space and multiplied it by 100 to get the percentage of plantable space.

Urban Heat Island Scores

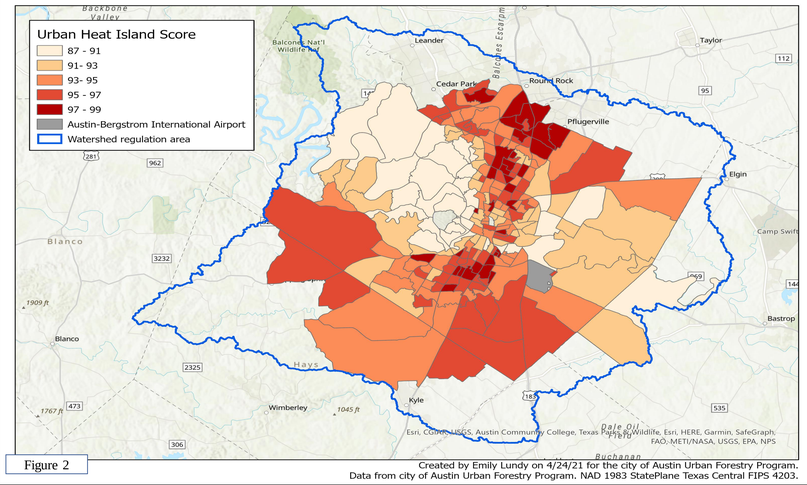

Figure 2

Created by Emily Lundy on 4/24/21 for the city of Austin Urban Forestry Program.
Data from city of Austin Urban Forestry Program. NAD 1983 StatePlane Texas Central FIPS 4203.

Conclusion and Future work

This project One of the primary concerns at present is the need for updated information to reflect the rapid development and demographic changes of the Austin area. Given the current analysis that have been presented, the projection of plantable space may further investigation of the rise of the urban heat scope. This will help influence the decisions of the Austin Urban Forestry Program to place trees in superior possible planting space.

Distribution of POC Residents

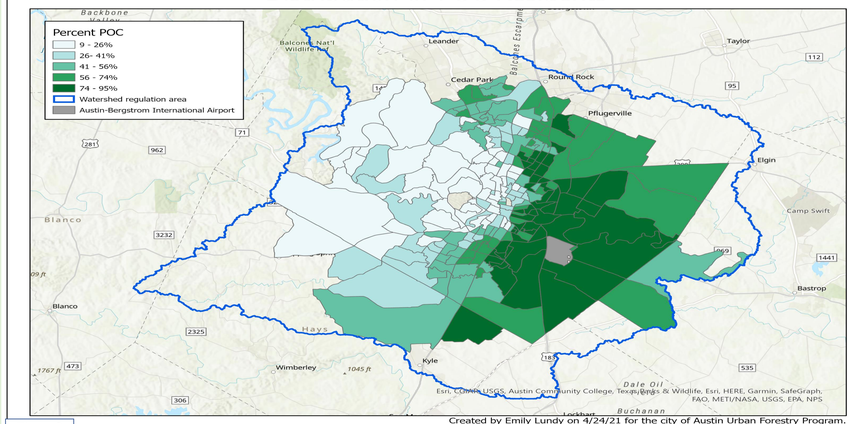

Figure 3

Created by Emily Lundy on 4/24/21 for the city of Austin Urban Forestry Program.
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Percentage of Residents in Poverty

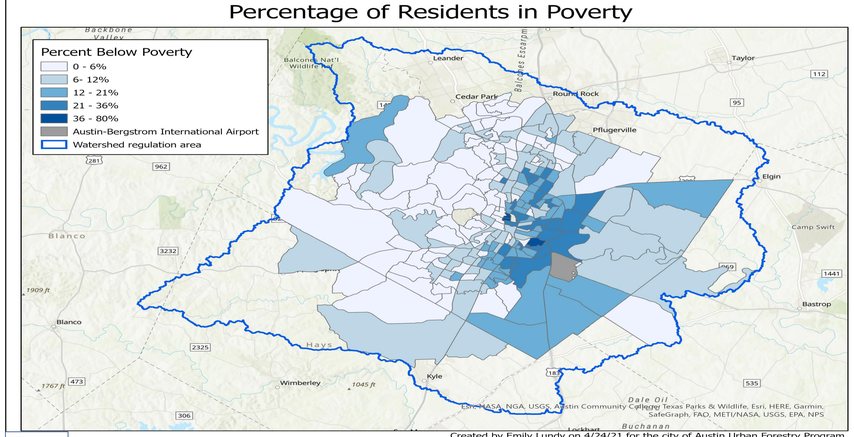

Figure 4

Created by Emily Lundy on 4/24/21 for the city of Austin Urban Forestry Program.
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Results

We expected to find that the full tree canopy capacity within Austin's watershed regulation area would be at about 68%, based on previous research. The full tree canopy capacity is the sum of an area's percent of existing canopy and its potential planting space. Our results show that most of the possible planting space would be in East Austin was correct. The area with the least amount of PPS was central Austin, followed by west Austin, as seen in figure 1. This result makes sense because central Austin is the oldest part of the city, and therefore has the most buildings and it has more impervious cover that was added to it over time. Our results show a correlation of PPS with residents of people of color, poverty, and high urban heat island. It's obvious that the majority of plantable space lines up very closely with the majority of where POC residents live (figure 3). Majority of people living in poverty currently live in the eastern portion of Austin (figure 4). The areas that have the highest UHI scores that also overlap with the areas that have a lot of potential planting space should be made top priority for planting new trees (figure 2).Without an adequate amount of urban forests, these neighborhoods are at risk of much higher temperatures during peak summer months than other areas of Austin As these areas begin to acquire more tree canopy it will lessen the areas of high urban heat, which will then result in lessen health risks for communities of poverty, and people of color.

References

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- Hoffman, J. S., Shandas, V., & Pendleton, N. (2020). The effects of historical housing policies on resident exposure to intra-urban heat: a study of 108 US urban areas. Climate, 8(1).