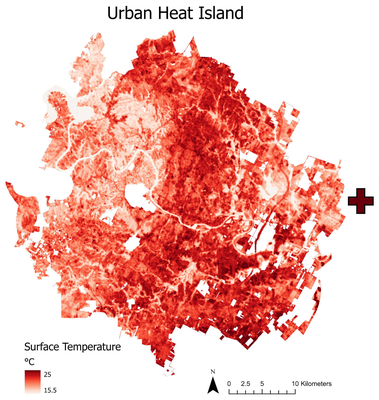
# Mapping Urban Agroforestry Opportunity in Austin, Texas

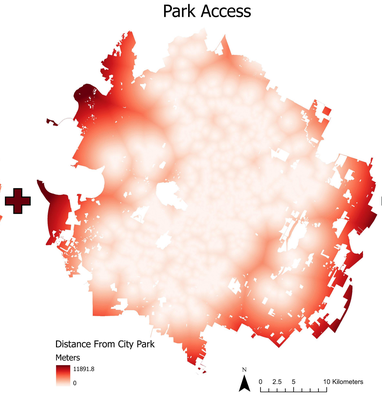
## Background

It is predicted that 68% of the human population will live in urban centers by 2050. This pattern will continue to put pressure on land utilized for both agriculture and conservation. Urban agroforestry is one solution to increasing the multi-functionality of urban land through providing numerous ecosystem services. However, these projects must be intentionally planned and executed.



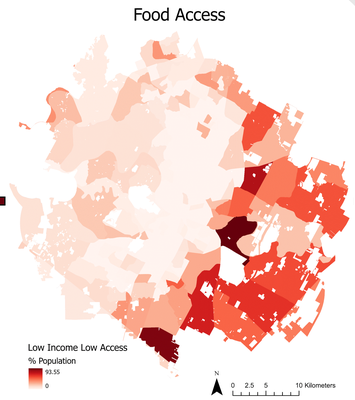

A model of the urban heat island effect was created utilizing Bands 4, 5, & 10 of Landsat 9. NDVI and emissivity were calculated to correct for error in Band 10's brightness temperature.

Data Source: U.S. Geological Survey. (2025, August 8). *Landsat 9 Collection 2 Level-2 scene LC09_L2SP_027039_20250808_20250809_02_T1, including Bands 4, 5, and ST_B10* [Dataset]. U.S. Geological Survey.



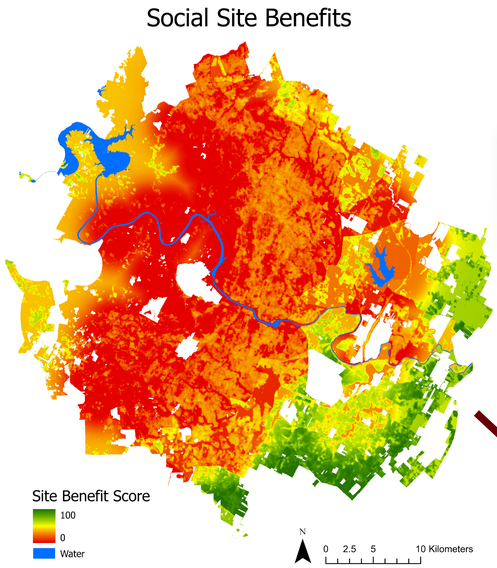

The Distance Accumulation tool was utilized to generate a raster calculating how far land was from city parks. This was done to identify where access to green spaces would be most beneficial to the community.

Data Source: City of Austin, Texas. (2026). *BOUNDARIES_city_of_austin_parks_20260422* [Vector dataset]. City of Austin Open Data.



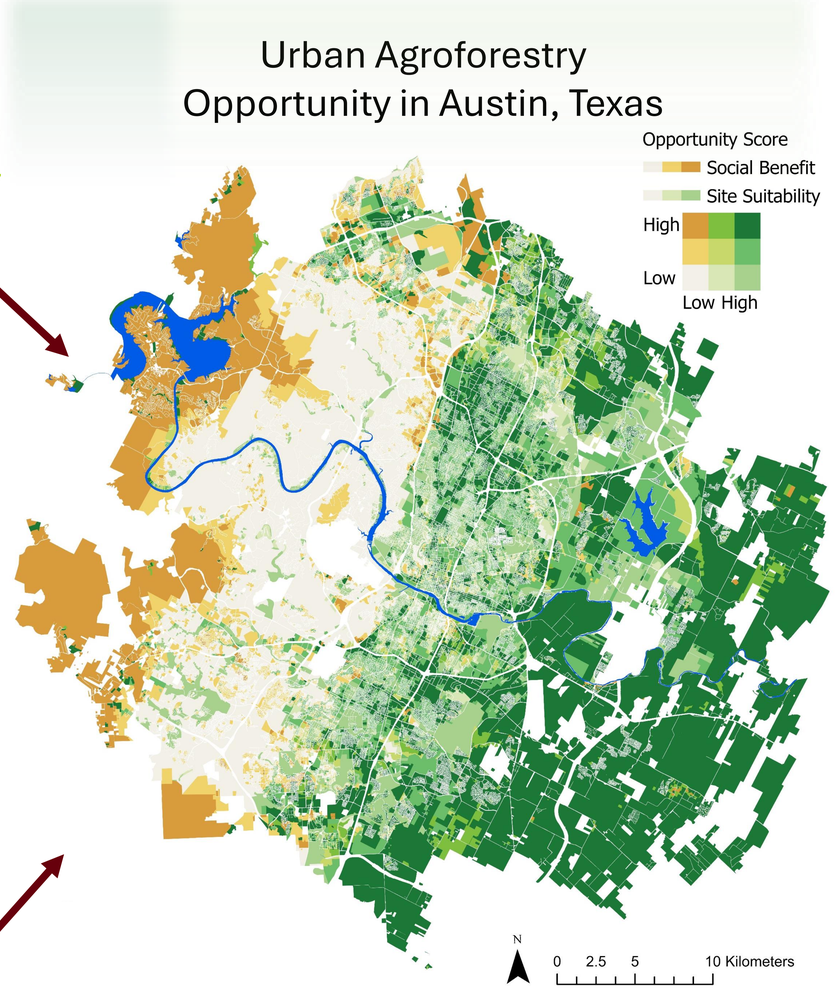

Tables were joined from the USDA's Food Access Research Atlas to Census Tracts to highlight high proportions of residents identified as both Low Income and have Low Access ( > 1 mile) to grocery stores.

U.S. Census Bureau. (2019). *TIGER/Line census tracts for Texas* [Dataset].U.S. Department of Commerce; U.S. Department of Agriculture, Economic Research Service. (2023). *Food Access Research Atlas* [Dataset]. U.S. Department of Agriculture.




## Results

| Opportunity Score Class | Number of Parcels | Acres | % of Parcels | % of Acres |
|---|---|---|---|---|
| 0-25 | 13939 | 30587.04 | 6.56 | 9.51 |
| 26-50 | 124706 | 150159.5 | 58.68 | 46.71 |
| 51-75 | 65890 | 103448.6 | 31.01 | 32.18 |
| 76-100 | 7979 | 37282.32 | 3.75 | 11.6 |




## Methods

**Input Data**
Soils, DEM, Parcels, Census Tracts, Landsat Rasters, Parks

**Preprocessing**
Project, clip, rasterize

**Community Benefit**
Food access, park proximity, heat island
-> Suitability Modeler

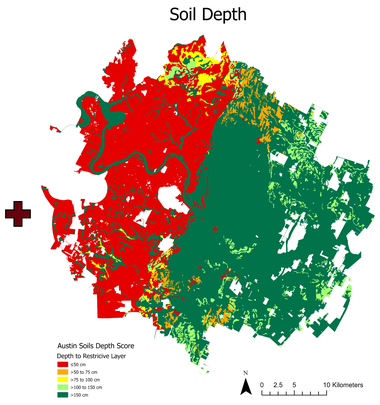
**Biophysical Suitability**
Soil drainage, depth, and slope
-> Suitability Modeler

**Parcel Summary**
Zonal statistics by parcel

**Opportunity Score**
Normalize scores to scale of 100
(Suitability + Benefit) / 2

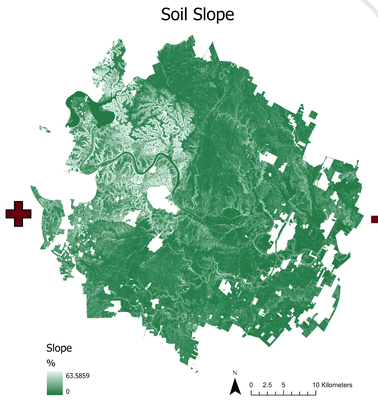
SSURGO soil component data was joined, sorted, and reclassified based on its drainage class. Many fruit and nut producing tree species require well drained soil.

Data Source: U.S. Department of Agriculture, Natural Resources Conservation Service. (2025). *Soil Survey Geographic Database (SSURGO)(gSSURGO) for Texas* [Dataset]. U.S. Department of Agriculture.



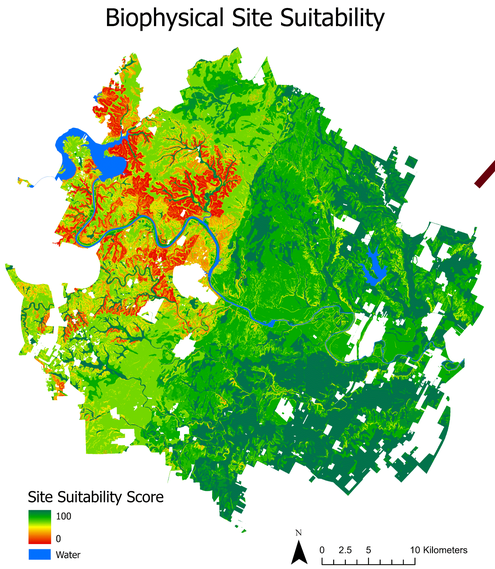

SSURGO component restriction data was joined, sorted, and reclassified to estimate soil depth available for fruit and nut trees to root for optimal health.

Data Source: U.S. Department of Agriculture, Natural Resources Conservation Service. (2025). *Soil Survey Geographic Database (SSURGO)(gSSURGO) for Texas* [Dataset]. U.S. Department of Agriculture.




Slope was derived from a digital elevation model, with preference given to areas with less steep angles. Gentler slopes are more ideal for tree installation, maintenance, and harvest.

Data Source: U.S. Geological Survey. (2024). *1/3 arc-second digital elevation model (3DEP) for Austin, Texas* [Raster dataset]. U.S. Geological Survey.




## Conclusion

While the average opportunity score for land parcels in Austin is 46, this study revealed there is significant acreage to practice Urban agroforestry. Many of the ideal parcels are located to the east of the Balcones Escarpment, which runs north to south through Austin. East Austin is situated within the Blackland Prairie and Cross Timbers of Texas and is still relatively undeveloped. This highlights the opportunity to incorporate urban agroforestry and provide ecosystem services such as food production, heat island mitigation, and access to green spaces.

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