

Rob and Melani Walton Sustainability Solutions Initiatives

Assessment of Tempe Canopy Coverage

sustainabilitysolutions.asu.edu

Summary

City of Tempe Canopy Study

Founded in 1894, the city of Tempe is located in the southeast part of the Greater Phoenix area and is landlocked in a 40.2 sq. mi land area. As such, Tempe is known for being a leader in urban living, its Tempe Town Lakes, housing and retail, history, culture, shopping, dining, nightlife, sports and special events. Walkability with the “20 minute city” vision is a high priority for the General Plan 2030, where citizens would be able to reach any destination in the city within 20 minutes, without the use of a car.

Client Challenge

Tempe would like to understand its current tree canopy coverage for proper maintenance and future urban forestry planning related to walkability, urban heat island reduction, city aesthetics and character, carbon sequestration, and city organizational structure for asset management and budgeting.

Project and Process

City of Tempe staff requested the services of ASU’s Walton Sustainability Solutions Services to research the current status of the tree canopy coverage. The Sustainability Solutions Services, an initiative of ASU’s Global Institute of Sustainability (GIOS), coordinated this project and facilitated meetings among Tempe staff, ASU personnel, researchers and students. Notably, Ariane Middel and The Center for Integrated Solutions to Climate Challenges, another Walton initiative, were engaged and provided the canopy coverage research.

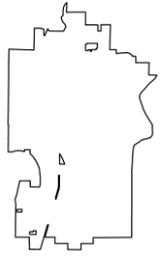
The ASU team benchmarked the tree canopy of the entire city of Tempe, by census tract, right-of way areas, character areas and, finally, irrigated areas. A CAP-LTER Land cover classification using an NAIP imagery dataset with a 1-m resolution capability was used to determine the canopy coverage as a whole, and within the requested areas. The dataset was created in 2010 and offers a 93.6% overall land cover classification accuracy.

Sustainability Solutions

The ASU team found that as of September 2010, Tempe had a 13.4% overall tree canopy coverage. SRP optionally irrigated areas had a tree canopy cover of 21.5%, while the right-of-way provides 1.6% canopy coverage.

Notably, census tract number 319007 in south Tempe boasted the highest percentage of tree canopy coverage at 25.8% with the second highest located in census tract 810100 at 24.2% canopy coverage. The lowest density of coverage was in census tracts 318400 and 319705, both at 6.8%. The character area Corona/South Tempe had the highest average at 20.5%, while the Papago/North Tempe and Diablo/Double Butte were found to have the lowest averages, both at 8.5%.

Data Sets Used



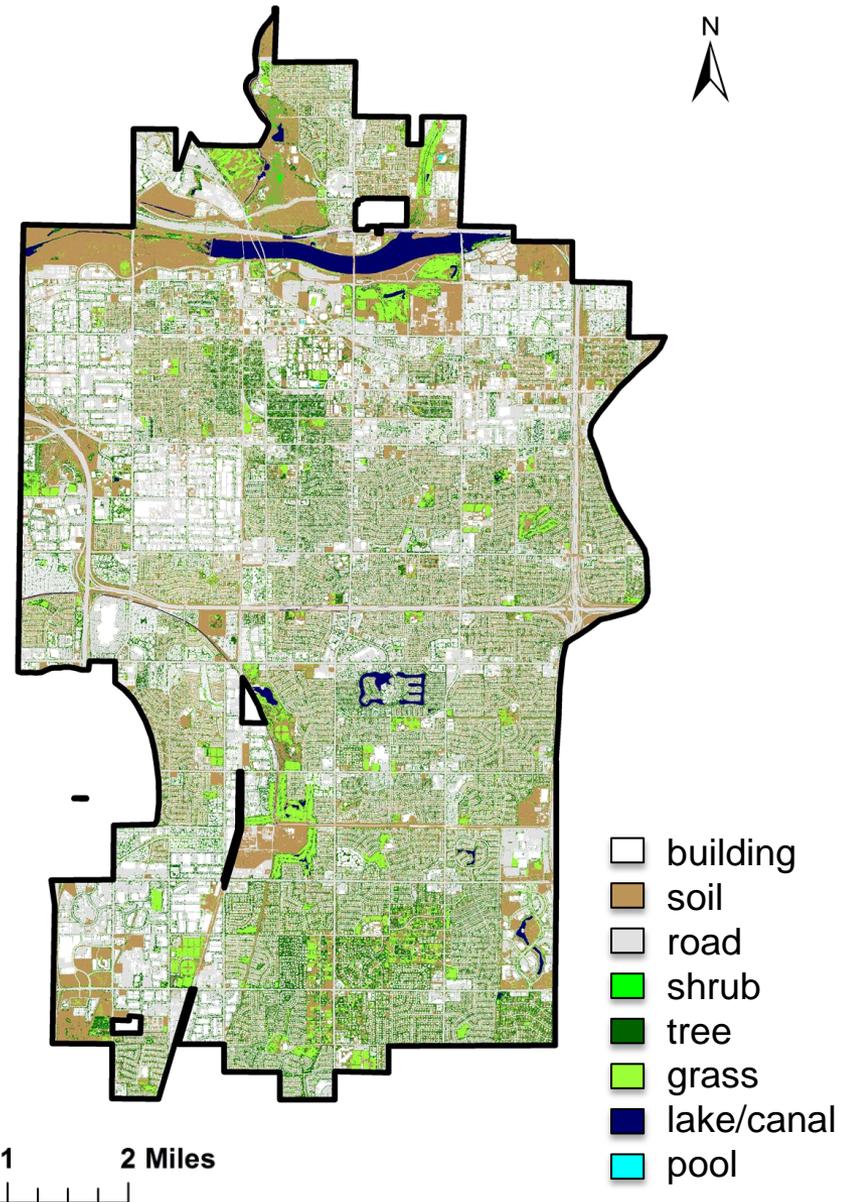
- **4 Band NAIP Land Classification of Central Arizona* : CAP LTER, by the Environmental Remote Sensing and Geoinformatics Lab, ASU, 2012**
- **Right-of-Way (ROW) Shapefile (buffered streets)**
 - Provided by Arlene Palisoc, City of Tempe
- **City boundary and Census Tract boundary Shapefile**
 - U.S. Census Bureau, 2010
- **Character area Shapefile**
 - Digitized from aerial image
- **SRP flood-irrigation Shapefile****
 - SRP, February 2010

* This project was primarily supported by the National Science Foundation under Grant No. BCS-1026865, Central Arizona–Phoenix Long-Term Ecological Research (CAP LTER) and undertaken through its affiliated Environmental Remote Sensing and Geoinformatics Lab (ERSG). Additional support was furnished by the Gilbert F. White Environment and Society endowment.

** SRP flood-irrigation offers irrigation in the highlighted areas. Not all customers utilize flood-irrigation.

NAIP Data Set

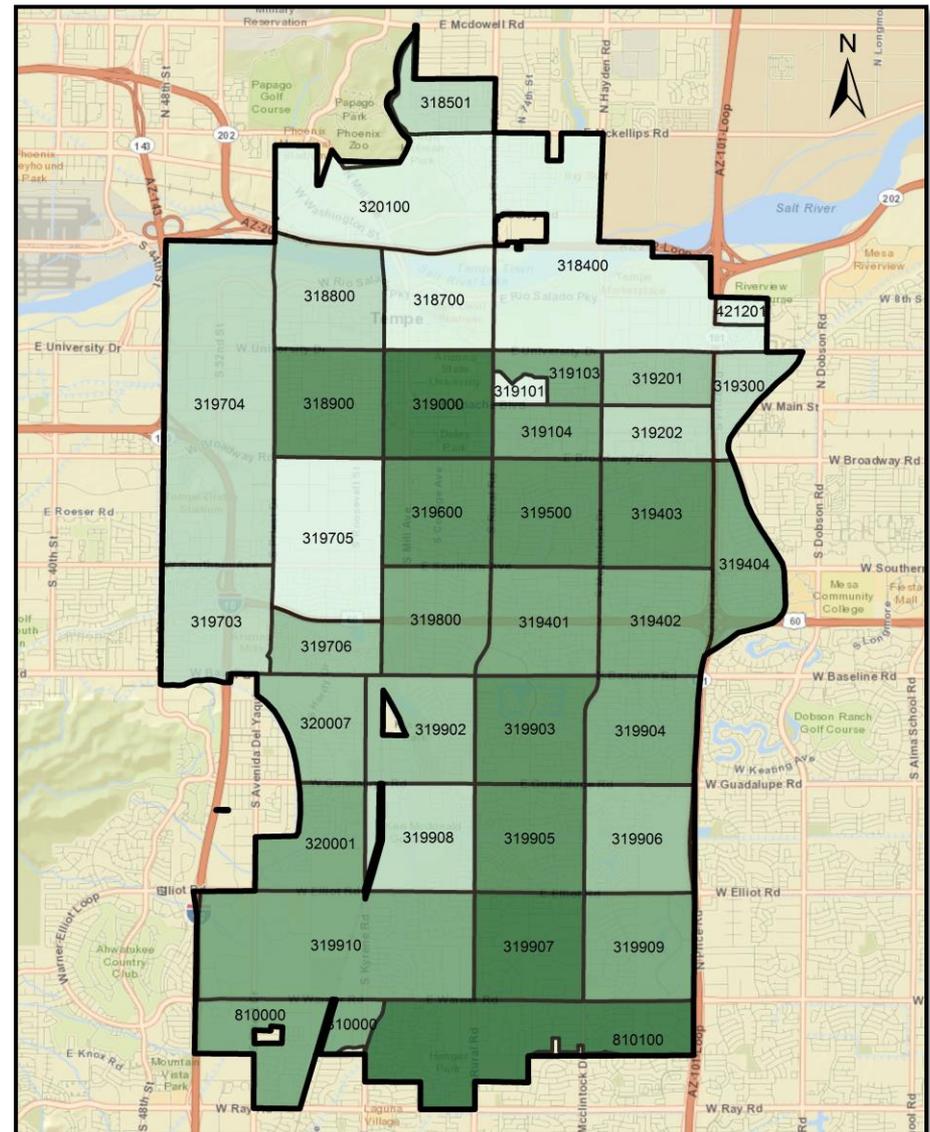
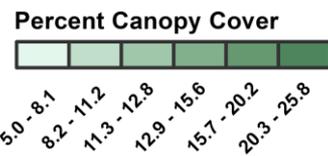
- 1-m resolution CAP-LTER land cover map
- Temporal coverage
 - 06/07/2010 – 09/10/2010
- Overall land cover classification accuracy
 - 93.6%



Results

Tree Canopy Cover in Tempe per Census Tract

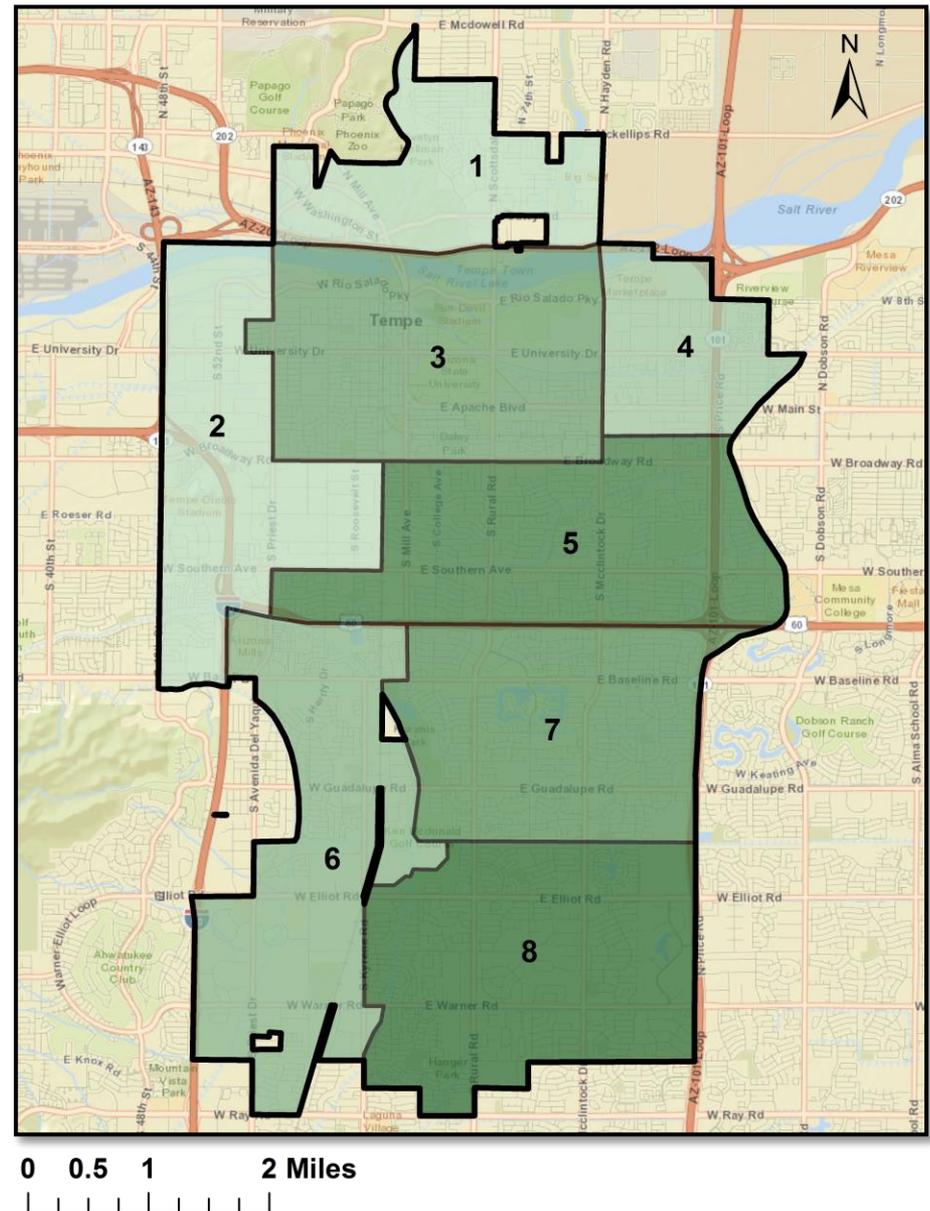
Census Tract No.	canopy cover [%]	canopy cover [acres]	Census Tract No.	canopy cover [%]	canopy cover [acres]
319600	20.2	128	320100	8.1	94
319800	14.9	93	319706	12.4	42
319500	16.3	104	319705	6.8	64
319906	12.8	80	319202	9.5	31
319908	10.5	65	421201	6.9	5
319403	16.3	107	319201	11.9	39
319902	12.7	77	319104	14.6	46
318800	10.3	65	319103	13.8	33
319101	7.8	6	319703	10.8	73
318900	17.1	109	319401	14.8	98
318501	10.7	33	319404	13.9	68
319903	18.9	125	318400	6.8	125
319704	9.0	173	319300	11.2	30
319907	25.8	165	810100	24.2	300
319904	15.0	96	810000	14.7	95
319000	21.5	137	319402	15.6	101
319909	14.7	95	319910	14.6	237
318700	5.0	30	319905	16.4	106
320001	15.0	77	320007	12.4	62



Tree Canopy Cover in Tempe per Character Area

Character Areas	canopy cover [%]	canopy cover [acres]
1 Papago/North Tempe	8.5	176
2 Diablo/Double Butte	8.5	262
3 Rio Salado/Downtown/ASU	12.1	461
4 Escalante/Marketplace	9.2	137
5 Central City/Shalimar	15.9	611
6 AZ Mills/Emerald Center	11.2	413
7 Kiwanis/The Lakes	15.4	531
8 Corona/South Tempe	20.5	827

Percent Canopy Cover

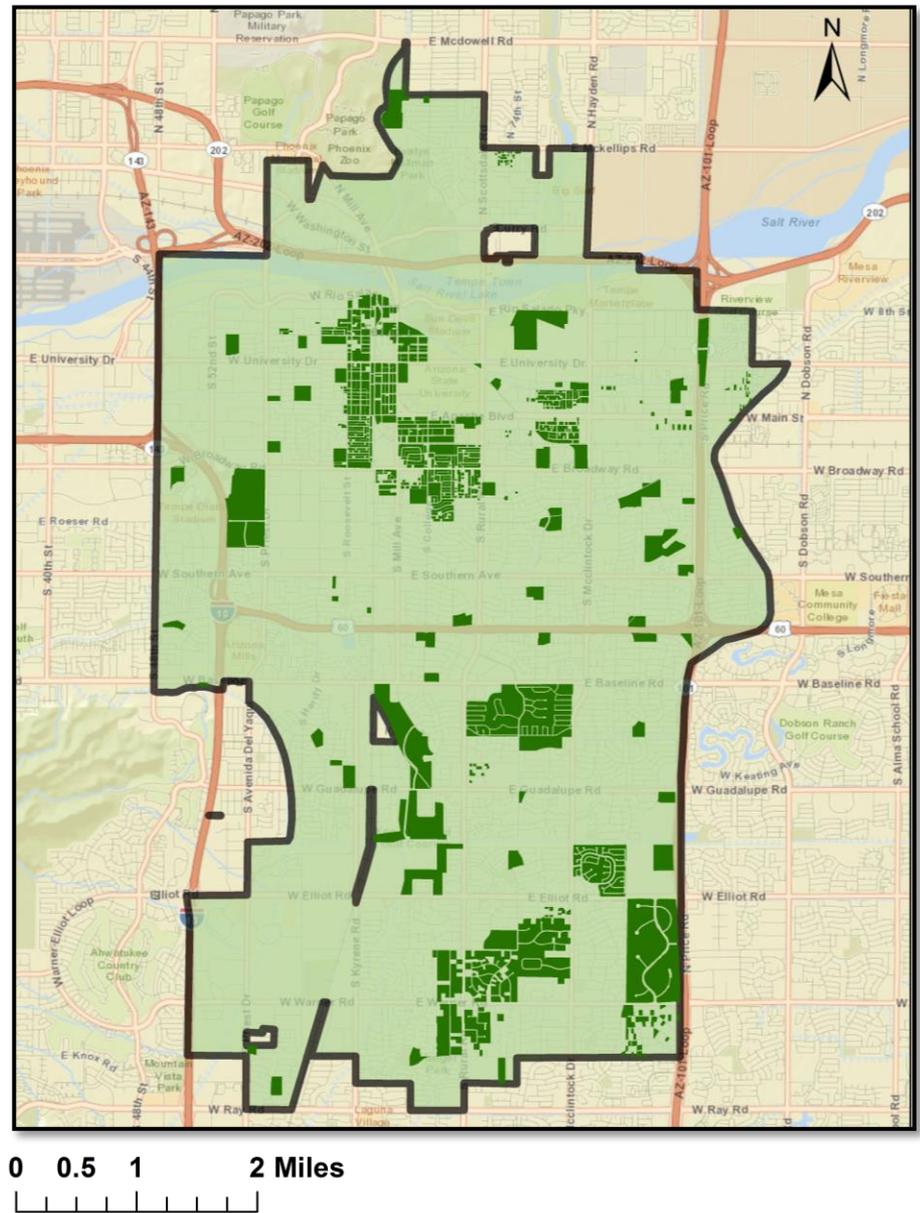


Tree Canopy Cover in Tempe Flood Irrigated Areas

Legend

-  SRP flood irrigated areas (21.5 % tree canopy cover)
-  Tempe non-flood irrigated areas (12.4 %)

** SRP flood-irrigation offers irrigation in the highlighted areas.
Not all customers utilize flood-irrigation.



Summary

- **Tempe overall canopy cover**
 - 3412 acres (13.4 % of total land area)
- **Tempe canopy cover in SRP irrigated areas**
 - 609 acres (21.5 % of irrigated areas,
2.4 % of total land area)
- **Tempe canopy cover in non-irrigated areas**
 - 2830 acres (12.4 % of non-irrigated areas)
- **Tempe ROW canopy cover**
 - 400 acres (1.6% of total land area)
- **Tempe canopy cover of publicly owned property**
 - 200 acres (0.78 % of total land area)

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Not all customers utilize flood-irrigation.

Recommended Next Steps

- 1. i-Tree Report – Includes financial and environmental valuations**
 - 1. Run with new sampling**
 - 2. Rerun with existing data**
- 2. Develop Urban Forestry Program with budget**

Questions?