CLEAN & GREEN POMONA'S TREE PLANTING PRIORITY INDEX
An Equity-Based Approach   May, 2023

TREE PLANTING PRIORITY INDEX
An Equity-Based Approach

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Background

Pomona, California is the seventh largest city in Los Angeles County, California, with a population of over 151,000 people, approximately 30 miles east of downtown Los Angeles. According to the US Census 2021 American Community Survey (5-year estimate), over 71% of the population identify as Hispanic or Latino. Nearly 11% identify as Asian, 10% white, and 6% African American. The city has a younger median age, with higher rates of poverty (15.1%), lower median household incomes ($70,494), and lower educational attainment (20% with college degree) when compared to the State and County. Nearly 26% of residents 5 years of age or older speak English less than "Very well," with a large majority of these individuals speaking Spanish (76%). This data suggests that Pomona is a young, predominantly minority community, with high rates of poverty, and challenges associated with limited educational attainment and linguistic isolation for a substantial percentage of the population.

The Challenge of Pollution Burdens. These demographic character-istics, combined with

Los Angeles County, California
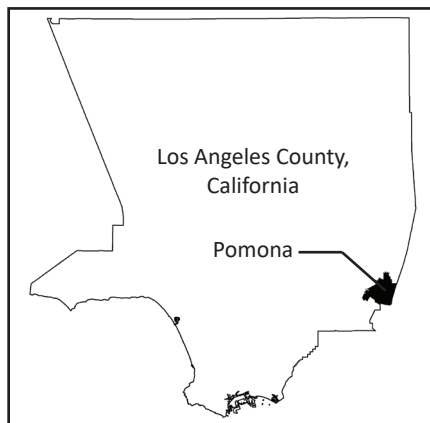
Pomona

documented pollution burdens and health outcomes, have prompted the State of California to designate 23 out of the 31 census tracts in the city as "Disadvantaged Communities," meaning they are

> *Pomona is a young, predominantly minority community, with high rates of poverty, and challenges associated with limited educational attainment and linguistic isolation.*

in the top 25% of census tracts based on CalEnviroScreen 4.0. Only one census tract in the city has a CalEnviroScreen score below the State Median, suggesting that challenges are pervasive across the vast majority of the city.
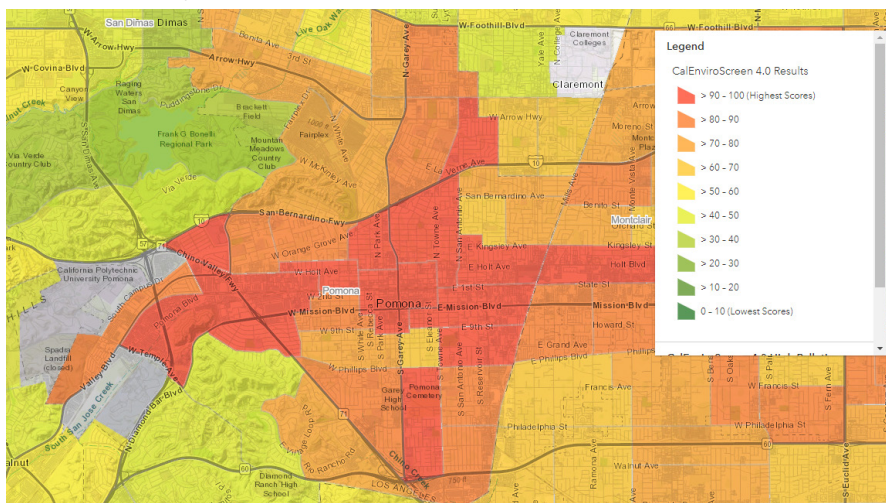
This analysis by the State of California is consistent with other findings, including those presented in the EPA's EJScreen tool. The entire city is above the 95th percentile nationwide in exposure to PM 2.5, ozone and air toxics cancer risk, and above the 80th percentile in the Air Toxics Respiratory Hazard Index. Portions of the community, particularly in south Pomona, are in the 80th percentile or higher for exposure to diesel particulate matter, hazardous waste and proximity to traffic.
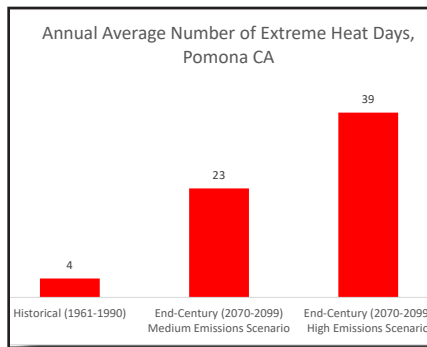
The combination of economic stressors and environmental conditions contribute to substantial disproportionate health challenges in the community. According to data from the Los Angeles County Department of Public Health, life expectancy is substantially lower in Pomona than surrounding cities. All but two census tracts are ranked in the 60th percentile or higher for emergency department treatment of asthma in CalEnviroScreen, and all but six are ranked in the 60th percentile or higher for cardiovascular disease.

The Challenge of Extreme Heat. One issue that exacerbates these health challenges is exposure to extreme heat. The Centers for Disease Control states that extreme heat waves are associated with death from heat stroke, cardiovascular, respiratory, and cerebrovascular diseases, as well as higher rates of hospital admissions for cardiovascular, kidney and respiratory disorders. Pomona's inland valley location in southern California results in hot summer temperatures, which are worsening with climate change. California's climate change data resource, *Cal-Adapt*, documents historical occurrence of extreme heat days, where temperatures exceeded

CalEnviroScreen 4.0 scores for Pomona. Twenty-three of the thirty-one census tracts in the city are classified as "Disadvantaged" with scores in the 75th percentile or above.

101.1 degrees F. Between 1961 and 1990, Pomona averaged 4 extreme heat days per year. In recent years, the average has been 13-18 days. The State's climate change scenarios project the number of extreme heat days to average 23-39 days annually by the end of the century, depending on levels of global climate change mitigation. This suggests that extreme heat will be an increasingly complicating factor for Pomona residents, particularly those with underlying cardiovascular and respiratory conditions.

The Lack of Tree Canopy. Local environmental conditions can either amplify or mitigate the impact of extreme heat events. The urban heat island effect often results in increased local temperatures in neighborhoods with higher densities, large expanses of paved surfaces and limited shading from tree canopy. California's Heat Island Index suggests that local conditions in Pomona increase temperatures from 8 to 11 degrees F in comparison to surrounding areas. The lack of tree canopy coverage in the city is a factor that contributes to this heat island effect. Citywide, Pomona has an urban tree canopy (UTC) coverage of 7.8% according to data from the USDA's i-Tree Landscape tool. This is less than neighboring communities such as Diamond Bar (12.2%), La Verne (11.8%) and Walnut (11.0%). The city's lowest income areas average just 4.0% UTC, and some industrial/workplace areas of the city have just 1.6% UTC. An increase in UTC within a neighborhood can significantly mitigate heat, particu-larly in arid climates like southern California.

Over the past two decades, the City of Pomona has had to remove thousands of dead and dying trees, as a result of drought, disease, and a changing climate. There has been a lack of consistent funding to provide replacement trees.
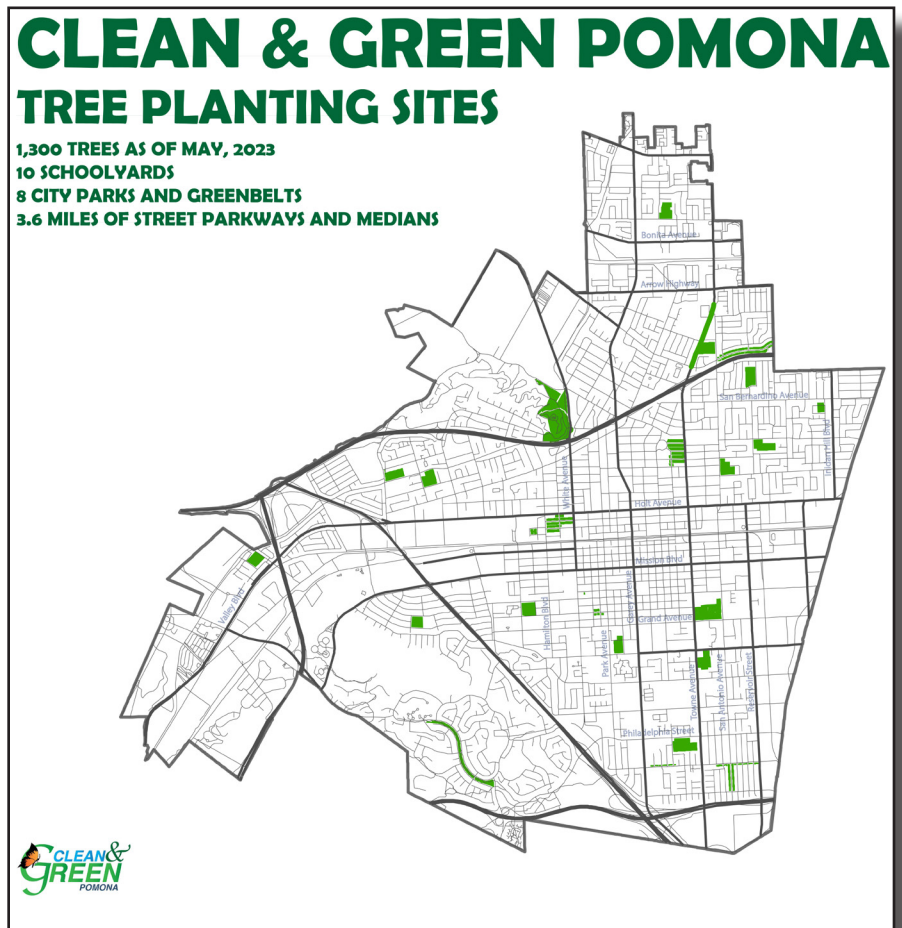

Annual Average Number of Extreme Heat Days, Pomona CA

		39
	23	
4		
Historical (1961-1990)	End-Century (2070-2099) Medium Emissions Scenario	End-Century (2070-2099) High Emissions Scenario

Days warmer than 101 degrees Fahrenheit are expected to increase 6-10 fold by the end of the century. Source Cal-Adapt.

Trees are planted by volunteers of all ages from the community at Clean & Green Pomona Volunteer Planting Events.

Clean & Green Pomona's Tree Planting Initiative. In response to the deteriorating condition of Pomona's urban forest, Clean & Green Pomona developed a tree planting initiative in 2017. This program has resulted in 1,300 trees planted mostly by volunteers, and funded entirely by grants and donations. Approximately 33% of trees have been planted in public schoolyards across the city, 27% have been planted in public parks, and 40% have been planted along city streets. While we have made a conscious effort to reach a wide number of neighborhoods with this work, our method of identifying sites for planting has primarily relied upon opportunities that present themselves through our partnerships with the City of Pomona and Pomona Unified School District. We have lacked a systematic way of prioritizing neighborhoods for planting in response to the inequities in socio-economic and environmental conditions.

CLEAN & GREEN POMONA
TREE PLANTING SITES

1,300 TREES AS OF MAY, 2023
10 SCHOOLYARDS
8 CITY PARKS AND GREENBELTS
3.6 MILES OF STREET PARKWAYS AND MEDIANS

An Equity-Based Approach

When challenges are pervasive, resources are limited, and politics are contentious, cities and organizations often rely on a strategy grounded in "equality," where individuals, groups, or neighborhoods are given the same quantity of resources or opportunities. Recent planting initiatives undertaken by the City of Pomona have utilized this approach, providing an equal distribution of new trees across council districts and parks. While such an approach may seem fair, with every neighborhood, park, or council district being treated the same, it ignores historic injustices that have resulted in the uneven distribution of assets, such as existing parks, as well as the uneven distribution of challenges, such as the socio-economic and environmental challenges facing "Disadvantaged communities."

In contrast, a strategy grounded in "equity" considers historic injustices, as well as the needs of different neighborhoods in terms of creating equally healthy conditions across the city. It is the equality of outcomes that is the measure of fairness in an equity-based approach. Instead of asking "how can we evenly distribute new trees across the city in an effort to improve the environment and address climate change?" the question becomes "Where can we focus our efforts to have the greatest impact in improving environmental quality?" Many cities and organizations embrace this equity approach, but often lack the data and analysis to target this approach, opting instead for metrics developed by other entities, such as California's CalEnviroScreen model, or experiential knowledge of the organization. While these methods can be effective, they may also lead to incorrect conclusions about

where the greatest benefits may be gained, and may be challenging to substantiate when seeking funding. There is a need for local equity-based models to inform decision-making.

Instead of asking "how can we evenly distribute new trees across the city in an effort to improve the environment and address climate change?" the question becomes "Where can we focus our efforts to have the greatest impact in improving environmental quality?"

Clean & Green Pomona's Model

Clean & Green Pomona has developed a Tree Planting Priority Index for the City, which considers environmental burdens, the distribution of green infrastructure, and socio-economic characteristics to understand inequities across the city. The model:
- Uses 12 indicators that characterize environmental burdens, deficits in green infrastructure, and socio-economic challenges at the census tract level.
- Uses an ordinal ranking system to provide a relative score of census tracts for each factor, in comparison to other census tracts in the city.
- Uses a scoring system in which the rankings of each indicator are averaged to determine an environmental burden score, a green deficit score, and a demographic score for each census tract.

- Combines each of these component scores to produce a Tree Planting Priority Score for each census tract, relative to other census tracts in the City.

Scores for environmental burden, green deficits and demographics are multiplied, as opposed to being simply added. This is consistent with the approach used by CalEnviroScreen, scientific literature, and risk scoring systems.

Limitations. It is important to note that the tree planting priority score only rank-orders the census tracts in the city, based on the factors that are included in the model. It does not identify a benchmark of

adequate tree cover, nor does it classify communities as "healthy" or "poor" in terms of its urban forest. A census tract with a low priority score should not be interpreted as having adequate tree canopy coverage or free of other challenges. As noted in the introduction, urban tree canopy is lacking across the city, and pollution burdens are excessive across the city, in comparison to many other communities. Further, this model does not consider the existing public infrastructure in priorizing neighorhoods, such as available parkways for planting Rather this model simply identifies the communities dealing with the greatest challenges, in an effort to understand where tree planting efforts may have the greatest impact in terms of working towards equality of outcomes.

Method. Development followed a multi-step process:
1. Identify potential indicators for each component.
2. Find sources of data to support indicator development.
3. Select indicators, assigning a value for each census tract.
4. Assign a rank for each indicator for each census tract, in comparison to other census tracts in the city.
5. Generate maps to visualize data.
6. Derive scores for environmental burden, green deficits, and demographic components.
7. Derive the overall Tree Planting Priority score by combining the component scores.
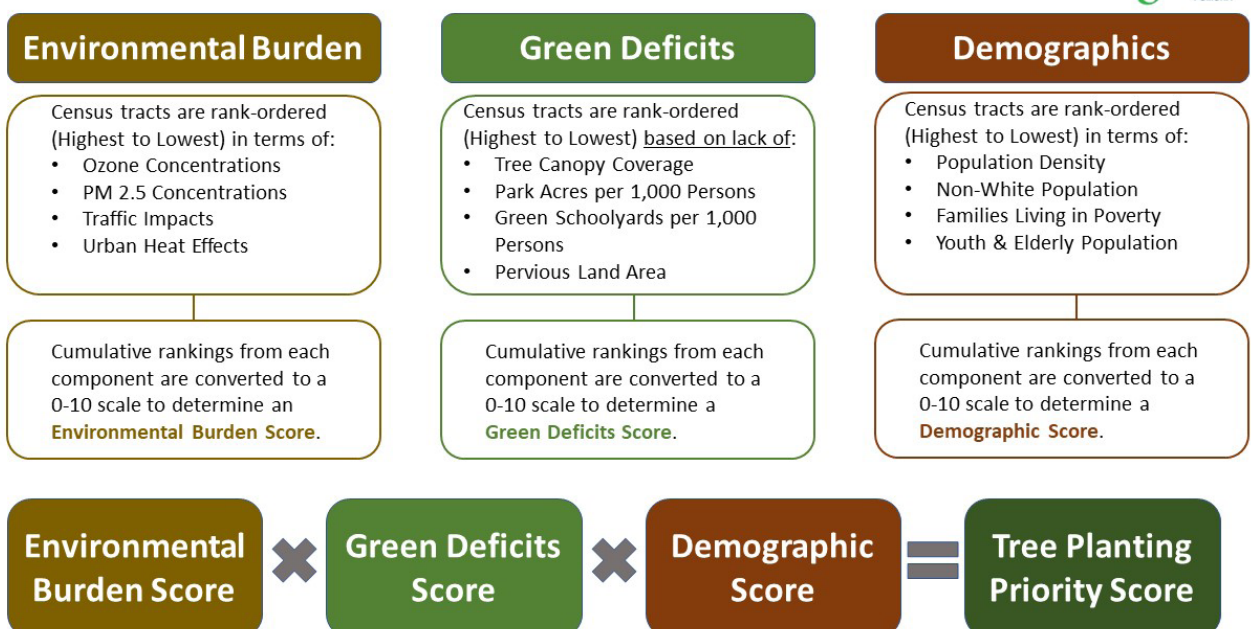8. Generate maps to visualize overall results.

Selection of specific indicators is based on scientific literature that informs their relevance to tree planting, and data availability. An equal number of indicators (4) were selected for each component, and no weighting was used to maintain simplicity and transparency.

Raw data about each indicator is recorded for each census tract. Census tracts are then Rank-Ordered within the city based on each indicator, and given a value 1-32 (32 being the census tract with the greatest indicator value). Rankings of each indicator are summed for each census tract to determine a preliminary score. These preliminary scores are then scaled so that they have a maximum value of 10 and a possible range of 0-10. To do this, each preliminary score was divided by the maximum value observed and then multiplied by 10. The scaling ensure that environmental burdens, green deficits, and demographics contribute equally to the overall tree planting priority score.

Finally, the Tree Planting priority score is calculated by multiplying the environmental burden score, the green deficit score, and the demographic score. Since each group has a maximum score of 10, the maximum Overall Score is 1,000. The census tracts are rank ordered from highest to lowest based on their overall score, and a percentile ranking is calculated based on this order. A census tract's Tree Planting Priority Score Percentile equals the percentage of all census tract scores in the city that fall below the score for that neighborhood. Maps are developed showing the percentiles for all census tracts in the city, highlighting the neighborhoods that score the highest.

Clean & Green Pomona Tree Planting Priority Index

Environmental Burden

Census tracts are rank-ordered (Highest to Lowest) in terms of:
- Ozone Concentrations
- PM 2.5 Concentrations
- Traffic Impacts
- Urban Heat Effects

Cumulative rankings from each component are converted to a 0-10 scale to determine an **Environmental Burden Score**.

Green Deficits

Census tracts are rank-ordered (Highest to Lowest) based on lack of:
- Tree Canopy Coverage
- Park Acres per 1,000 Persons
- Green Schoolyards per 1,000 Persons
- Pervious Land Area

Cumulative rankings from each component are converted to a 0-10 scale to determine a **Green Deficits Score**.

Demographics

Census tracts are rank-ordered (Highest to Lowest) in terms of:
- Population Density
- Non-White Population
- Families Living in Poverty
- Youth & Elderly Population

Cumulative rankings from each component are converted to a 0-10 scale to determine a **Demographic Score**.

Environmental Burden Score ✖ **Green Deficits Score** ✖ **Demographic Score** = **Tree Planting Priority Score**

Tree Planting Priority Scores are converted to percentile rankings to identify relative need of census tracts.
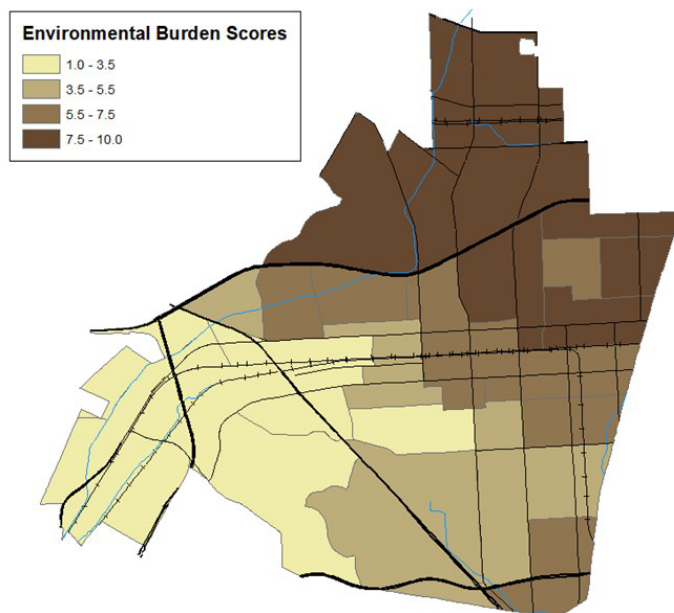
Environmental Burden Indicators

Indicators of environmental burden were selected based on their impact on public health, as well as the ability for tree planting to offer potential mitigation of some effects. Indicators include relative exposure of residents to the following:

Ozone Concentrations. Ozone pollution causes numerous adverse health effects, including respiratory stress. CalEnviroScreen 4.0 ozone values are used for census tracts, modeled after data from California Air Resources Board air monitoring stations.

Particulate Matter (PM 2.5) Concentrations. Fine particle pollution has been shown to cause numerous adverse health effects, including heart, lung disease, and cancer in the case of diesel particulates. CalEnviroScreen 4.0 PM 2.5 values are used for census tracts, modeled after data from California Air Resources Board air monitoring stations.

Traffic Impacts. Traffic, particularly along overburdened freeways, is a significant source of air pollution. Exhaust from vehicles contain toxic chemicals and plays a role in the formation of smog. CalEnviroScreen 4.0 traffic impact values are used for census tracts, based on traffic volumes and road length within 150 meters of census tracts.

Urban Heat Effects. Urban areas experience higher temperatures, greater pollution, and greater negative health impacts during summer months, than compared to nearby rural areas. Data from California's Urban Heat Island Index is used to determine positive temperature differential of census tracts over time, expressed in degree-hours per day. Dividing index values by 24 hours and multiplying the result by 1.8 degrees provides an approximate conversion of the heat differential per day in degrees Fahrenheit. Pomona census tracts exhibit on average, 8-11 degrees F warmer temperatures over nearby rural areas.

Environmental Burden

Census tracts are rank-ordered (Highest to Lowest) in terms of:
- Ozone Concentrations*
- PM 2.5 Concentrations*
- Traffic Impacts*
- Urban Heat Effects**

Cumulative rankings from each component are converted to a 0-10 scale to determine an **Environmental Burden Score**.

Source: OEHHA. 2021. CalEnviroScreen 4.0 Indicator Data.
*** Source: CalEPA. 2015. Urban Heat Island Index for California.*

Environmental Burden Scores

	1.0 - 3.5
	3.5 - 5.5
	5.5 - 7.5
	7.5 - 10.0

Note: Darker areas on map represent census tracts with greater environmental burden.

Green Deficit Indicators

Green deficit indicators measure the extent to which the existing landscape within census tracts offers some benefits for public health improvement. Indicators identify the relative absence or lack of the following green assets in the census tracts:
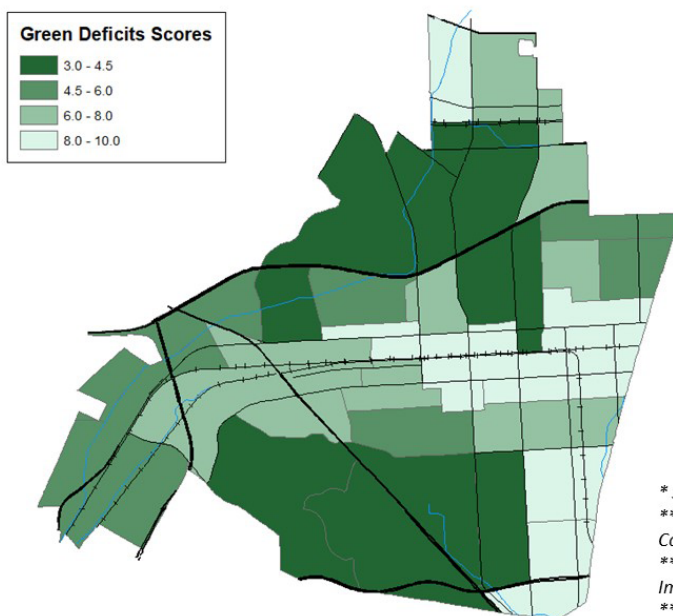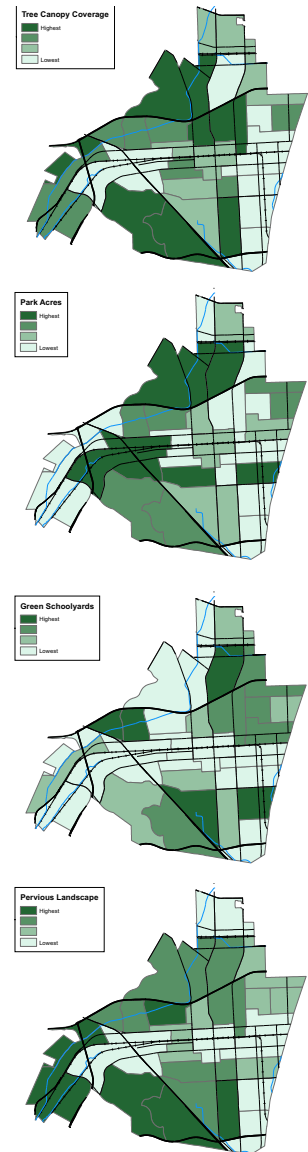
Tree Canopy Coverage. A healthy tree cover protects residents from pollution-related diseases, ameliorates the effects of urban heat, and boosts overall quality of health. The percent of urban tree canopy coverage is calculated at the census tract level using HiRes land cover data from the i-Tree Landscape assessment tool from the USDA Forest Service.

Park Acres. Designated park space provids an important green amenity that supports community health and can effect urban heat and pollution levels. Acres of park land is calculated at the census tract level based on the City of Pomona Park Finder Application. Population data from the 2019 American Community Survey, 5-year estimate, is used to calculate park acres per 1,000 residents.

Green Schoolyards. Similar to parks, public schoolyards with green space are an important public asset to boost overall health. Identification and analysis of green schoolyard acreage from Google Earth imagery, was divided by 2019 American Community Survey, 5-year estimate, population data, to determine acres of green schoolyards per 1,000 residents.

Pervious Landscape. Pervious land area provides stormwater benefits and other services that reduce the effects of pollution and urban heat. Data on the percent of plantable space (land that is not water, impervious surface or trees) was obtained from 2011 land cover data from the i-TRee Landscape assessment tool from the USDA Forest Service.

Green Deficits

Census tracts are rank-ordered (Highest to Lowest) based on lack of:
- Tree Canopy Coverage*
- Park Acres per 1,000 Persons**
- Green Schoolyards per 1,000*** Persons
- Pervious Land Area****

Cumulative rankings from each component are converted to a 0-10 scale to determine a **Green Deficits Score**.

Source: USDA. n.d. i-Tree Landscape High Resolution Land Cover Data.
*** Sources: City of Pomona. n.d. Park Finder Application; 2019 American Community Survey, 5-year estimate.*
**** Sources: Clean & Green Pomona. 2023 analysis of Google Earth Imagery; 2019 American Community Survey, 5-year estimate.*
***** USDA. 2011. i-Tree Land Cover Data.*

Note: Lighter areas on map represent census tracts with greater green deficits.

Demographic Indicators

Demographic indicators reveal the relative number of individuals impacted by conditions in the census tract, as well as characteristics that historically represent challenges and increased vulnerability.

Population Density. Population density indicates the relative number of people affected by conditions in the census tract. Population per square mile is calculated based on data from the 2019 American Community Survey, 5-year estimate.

Non-White Population. Environmental justice research has established that black, indigenous, communities of color are disproportionately impacted by environmental negatives, and disproportionately deprived of environmental assets. The pecentage of residents who do not identify "White, not Latino" from the 2019 American Community Survey, 5-year estimate, was used to calculate the percent of non-white population at the cenus tract level.

Families Living in Poverty. Poverty represents a significant social stressor that impacts quality of life, opportunity, and overall health. Data from the 2019 American Community Survey, 5-year estimate, was used to determine the percent of families living in poverty for each census tract.

Youth & Elderly Population. Young people and the elderly represent populations most impacted by unhealthy conditions and often require additional care as a dependent population. The percentage of poulation under the age of 18 and 65 years of age or older, was determined based on data from the 2019 American Community Survey, 5-year estimate, at the census tract level.
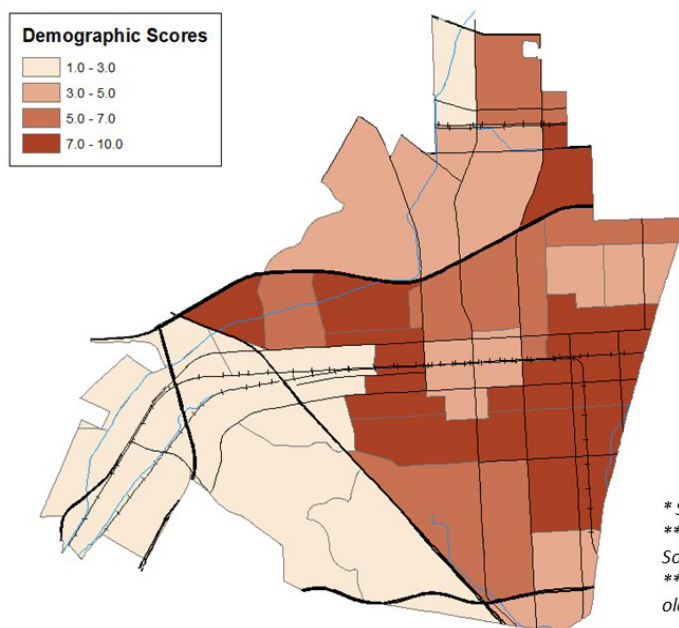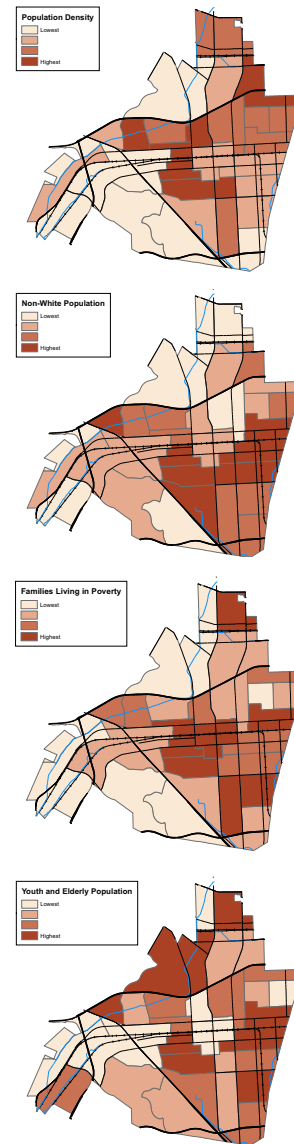
Note: Darker areas on map represent census tracts with greater demographic challenges.

Demographics

Census tracts are rank-ordered (Highest to Lowest) in terms of:
- Population Density*
- Non-White Population**
- Families Living in Poverty*
- Youth & Elderly Population***

Cumulative rankings from each component are converted to a 0-10 scale to determine a **Demographic Score**.

Source: 2019 American Community Survey, 5-year estimate.
*** Percentage of population who do not identify as "White, not Latino." Source: 2019 American Community Survey, 5-year estimate.*
**** Percentage of population under the age of 18 and 65 years of age or older. 2019 American Community Survey, 5-year estimate.*
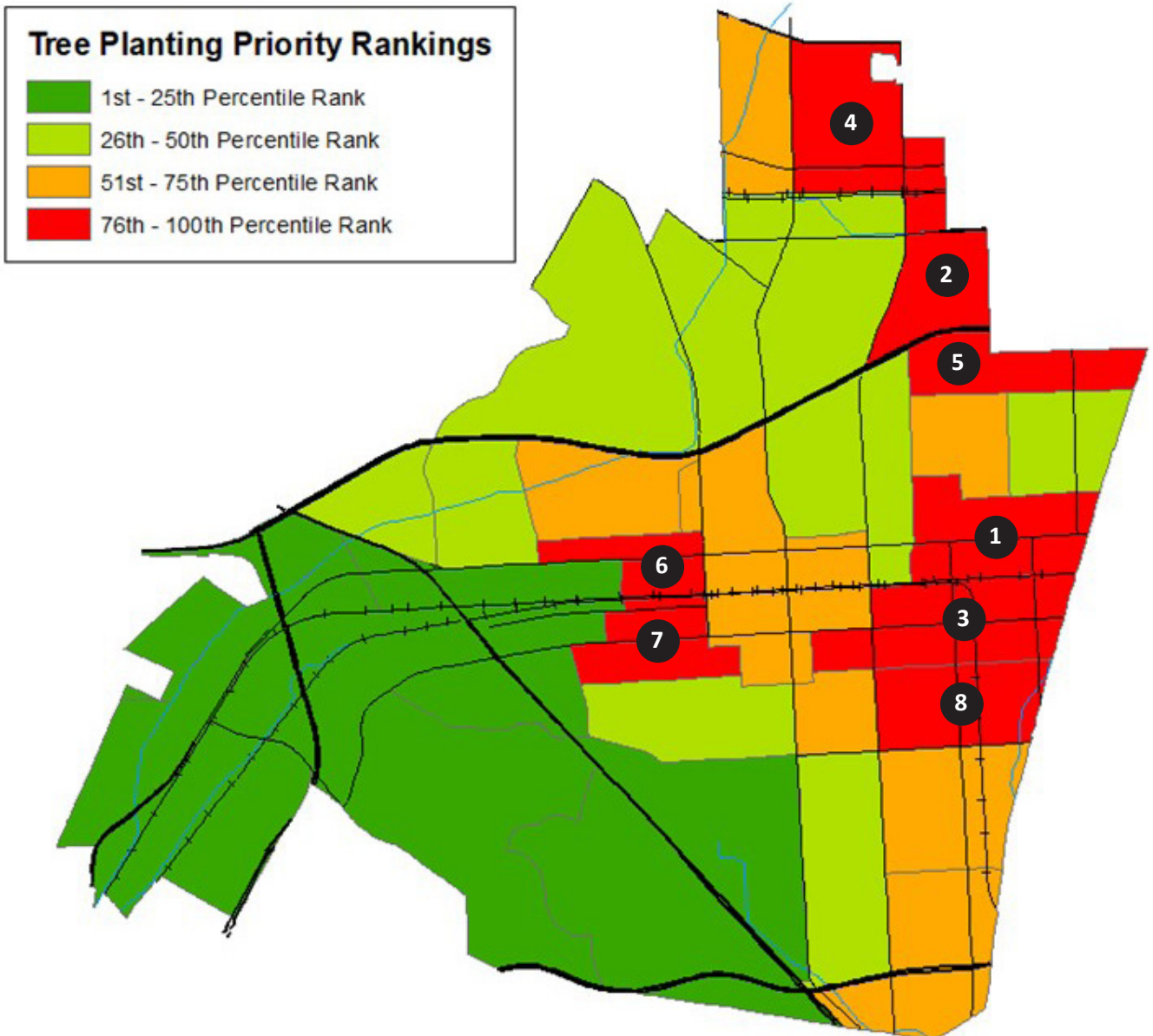
Tree Planting Priority Index

Clean & Green Pomona's Tree Planting Priority Index rank-orders the census tracts in the city for planting priority based on the combination of environmental burdens, existing green infrastructure and demographic characteristics. The resulting rankings are then described as percentiles. A census tract's percentile reflects the percentage of census tracts in the city with a lower ranking.

The results reveal 8 census tracts with rankings greater than the 75th percentile, suggesting a focus on these neighborhoods for future planting efforts. However, it should be noted that a lower ranking does not mean a census tract should not be considered for planting. The tree canopy coverage in most tracts is lower than neighboring cities, and environmental burdens, green deficits and demographic factors present challenges througout the city.

The top priority census tracts are aggregated into three parts of the city: The Northeast corner, the Eastern Edge, and the West-Central portion of the city, adjacent to downtown. Second-tier priority areas include Downtown, and a number of dispersed residential tracts. Lower priority areas tend to be concentrated in the Western part of the city, primarily West of the 71 Freeway.

Tree Planting Priority Rankings

- 1st - 25th Percentile Rank
- 26th - 50th Percentile Rank
- 51st - 75th Percentile Rank
- 76th - 100th Percentile Rank

Census tracts in the highest priority category include:

1 **East Holt Avenue (Tract # 4027.02)**. This census tract centers around the East Holt Avenue corridor, between San Antonio Avenue and the Eastern boundary of the city. Prominent landmarks include The Village at Indian Hill, Garfield Park, and San Antonio Elementary School. Clean & Green Pomona has previously planted trees at San Antonio Elementary in this tract.

2 **Barfield Elementary School (Tract # 4021.01).** This tract is a predominantly residential area, located North of the 10 Freeway, East of Towne Avenue. Barfield Elementary School is the most prominent landmark. There are no parks in this tract. Clean & Green Pomona has planted at Barfield Elementary, and along two street segments in this neighborhood, E. La Verne Avenue and the Towne Avenue Median.

3 **East Mission Boulevard (Tract # 4028.01).** This census tract includes the East Mission Boulevard corridor from San Antonio Avenue to the Eastern City Boundary. While there are residential neighborhoods in the tract, a large portion includes the city's industrial zone. Washington Elementary is located within this tract. There are no parks. Clean & Green Pomona has not previously planted in this census tract.

4 **Willie White Park (Tract # 4017.04).** This tract is the area East of Garey Avenue, extending from the Foothill Avenue corridor to the North, and the railroad tracks to the South. It is mostly residential, with a few pockets of commercial activity along its edges. Landmarks include Willie White Park, Harrison Elementary School, and Casa Colina Hospital. Clean & Green Pomona has previously planted at Harrison Elementary in this tract.

5 **Allison Elementary School (Tract 4027.03).** This census tract runs South of the 10 Freeway, between San Antonio Avenue and the Eastern edge of the City. San Bernardino Avenue is its Southern boundary. The tract is mostly residential, except the Indian Hill Blvd commercial corridor. It includes Jaycee Park and Allison Elementary School. Environmental burdens from pollution exposure and freeway traffic are primary factors influencing this tract's priority ranking. Clean & Green Pomona has previously planted at Allison Elementary School.

6 **Hamilton Park (Tract # 4023.04).** This census tract is located West of Downtown, North of the railroad tracks, between White Avenue and Dudley Street. It includes a significant portion of the West Holt Avenue corridor and has the greatest population density of all tracts in the city. The tract includes Hamilton Park and has no public schools. Clean & Green Pomona has planted along a number of streets in this tract.

7 **Lopez Elementary (Tract # 4025.01)**. This tract is West of Downtown, South of the railroad tracks. Ninth Street is its Southern boundary, and includes a portion of the West Mission Boulevard corridor. Landmarks include Lopez Elementary School and the Lopez Urban Farm. The tract does not include any parks. Clean & Green Pomona has not previously planted in this census tract.

8 **Washington Park (Tract # 4028.04).** This tract is bounded by Towne Avenue on the West, the Eastern City boundary on the East, Ninth Street to the North, and Phillips Blvd to the South. Washington Park is the most prominent landmark in this tract. Despite having one of the largest parks in the city, this tract is challenged by including a significant portion of the Eastern industrial zone. Clean & Green Pomona planted at Washington Park in 2022.

The Clean & Green Pomona Tree Planting Priority Index will inform our future planting and advocacy efforts, as we work improve equity in the City of Pomona and counteract historic environmental, infrastructural, and demographic challenges facing our neighborhoods.

Over 50 volunteers joined us at Hamilton Park on December 3, 2022 to celebrate the planting of Clean & Green Pomona's 1,000th tree in the City.