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Tales of Urban Livability—Vermont Avenue in Los Angeles as Told by Tree Canopy Cover

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TALES OF URBAN LIVABILITY – VERMONT AVENUE IN LOS ANGELES AS TOLD BY TREE CANOPY COVER

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CHAPTER 1

INTRODUCTION

What is the Problem?

We walk, drive, run, bike, and move past trees on a daily basis. We often forget to notice the green giants that we move past. However, more often than not, we are reaping the benefits of having trees around us without even knowing it. This phenomenon is known as "plant blindness" (Wandersee and Schussler 1999). Wandersee and Schussler define plant blindness as "the inability to see or notice the plants in one's environment." Because we–everyday civilians, commuters, residents–are not usually aware of our natural surroundings, we often ignore the simple forms of life that make up a healthy ecosystem which bring color into our lives. We do not think about the presence of plants, specifically trees, until we are in the absence of them. One excellent example of this momentary realization is the need for shade when we are waiting at a bus stop in East Los Angeles, or when we are standing in line waiting for our order to be ready at a local food truck. As city-goers and residents of urban and suburban spaces, we are constantly on the move. It is no surprise that we often neglect the static trees and plants that seemingly blend into the background of our day-to-day rush to our next destination. Unfortunately, once we do have a chance to pause to take a look around us, or to pause long enough to feel the heat of the sun beaming down on our bare skin, we are decades too late in realizing the absence of trees at the location in which we are standing.

This blindness and the inability to recognize the importance of plants leads to "the erroneous conclusion that [plants] are unworthy of human consideration" (Allen 2003). It must be noted that "the term plant blindness is ableist and problematic because it positions "blindness" as a deficit that must be cured and negates the possibility that blind people can lead lives that are full of rich sensory flora experiences" (McDonough et al., 2019). This ableist language and narrative must be shifted to positively promote plant appreciation and learn to give more care to

the nature around us. This becomes especially important to us civilians since we live and move among urban spaces where trees are intentionally planned for; behind every tree that has been planted in the City of Los Angeles is a set of political decisions that have been made. By not giving more attention and care to the trees and plants that surround us, we are giving up our authority and rights as residents, civilians, pedestrians, and occupants of the streets and neighborhoods to equitable and adequate pedestrian and road infrastructure, in which trees and the benefits associated with tree cover play a large role. Oftentimes, political planning decisions are predicated on decades of history of redlining and environmental racism in the United States. We are the ones living and moving among these urban streetscapes, so we should know our streets, neighborhoods, and our needs the best; therefore, we must not allow the institution the opportunity to further perpetuate nor reinforce the outdated and racist city planning decisions of the past (Stewart and Wachtel, 2017; Reft, 2017; Tijerina, 2019).

What is the Objective?

This thesis contributes critical insight to these research questions: Does tree canopy cover (TCC) have roots in redlining and environmental racism in Los Angeles (LA)? What can tree canopy cover tell us about residents' quality of life in LA? What role do trees play in LA's urban streetscape and pedestrian infrastructure?

A comprehensive literature review will establish context on the significance of trees (Chapter 2-4). GIS will be the tool used to analyze LA's tree cover data in conjunction with LA's social demographic data (i.e. race, age, household income, education level, property price, etc) (Chapter 5). This data analysis and research will be complemented with and grounded by a walking ethnography and case study of tree cover throughout sections of Los Angeles's 23-mile

long Vermont Avenue (Chapter 6-7). This analysis utilizes tree canopy cover as an indicator of walkability in Los Angeles and as a visual manifestation of the urban environmental inequities that many LA residents face on a daily basis, such as the unequal distribution of tree canopy in LA. Walkability can be defined by the "traversability" of a street, or the basic conditions of walking, in conjunction with proximity and safety (Forsyth, 2015), which were all factors that are explored in the walking ethnography. The goal of this project is to ultimately reveal the disparities in tree cover among the different neighborhoods of Los Angeles and to highlight the implications that result from inconsistencies in tree cover in LA, which put the city's urban planning and public health priorities into question.

What is tree canopy cover (TCC)?

According to the USDA, tree canopy cover "is the leafy, green, overhead cover from trees that community groups, residents, and local governments maintain in the landscape" (US Forest Service, 2019). In other words, tree cover refers to the layer of tree leaves and branches that provide shade on the ground and covers the actual ground when viewed from above. There are various methods and tools used to measure a tree's canopy cover depending on the type of study that is being done (King and Lock, 2013). However, the main aspect of tree canopy that is measured is the tree crown, which "displays the leaves to allow capture of radiant energy for photosynthesis" and is an indicator for the overall health and the growth of the tree (Brack, 1999). Although there is no one standard way of measuring tree canopy, the basis of measuring tree canopy cover is by assessing the width of the tree crown. This can be done "by projecting the edges of the crown to the ground and measuring the length along one axis from edge to edge

through the crown centre" and the measurement would be finalized relative to the width of the other axis for trees that are not regular in shape (Brack, 1999).

The more technical and quantifiable definition of tree cover canopy is "the percentage of a site covered by the canopies of trees" (McPherson et al., 2011). It is important to note that the size of the area of the TCC measured does not matter as much as the size measured across time and space as cities push out more TCC targets. Unfortunately, in a 2018 study across 45 states in the United States, TCC had been found to be declining annually at a rate of 0.12 percent or 175,000 acres of tree cover per year (Nowak and Greenfield, 2018). At the same time, 47 states showed "an annual net increase of 0.12 percent or 167,000 acres of impervious cover" (Nowak and Greenfield, 2018). In the same study, it has been found that urbanization is a contributor to the loss of TCC as the loss of TCC in "urban areas"--comprised of "a densely settled core of census tracts and/or census blocks that meet minimum population density requirements--is greater than the TCC loss in "urban community" areas, which is what Nowak and Greenfield define as land that "may consist of all, some, or no urban land within their boundaries" as demarcated by geopolitical boundaries. Essentially, the loss of TCC is higher in highly populated dense urban regions, "most likely due to the greater population density and urbanization pressures" (Nowak and Greenfield, 2018). All of this highlights the staggering unequal distribution of tree canopy cover across the city.

CHAPTER 2

TREE CANOPY COVER IN LA

TCC in LA

The problem of the lack of tree cover canopy is clear in the City of Los Angeles as the percentage of tree cover in LA is a low 21%, which is below the national average of 27% in urban areas and 33% in metropolitan areas (cwp.org). For a big city like Los Angeles that has distinct and diverse neighborhoods, it is especially concerning when the rate of TCC ranges from as low as 7% to as high as 37% depending on each council district (McPherson et al., 2008; McPherson et al., 2010). This means that tree canopy cover is not dispersed evenly across the city, which has many social justice and public health implications as tree cover has many measurable benefits to overall human wellbeing.

Past Tree Planting Initiatives

This lack of tree canopy is not a recent issue–it has been addressed in the past. At the beginning of former Los Angeles Mayor Antonio Villaraigosa's time in office in 2006, he proposed and launched a program to plant and steward 1 million trees in the City of Los Angeles. His goal was to make LA a leader in sustainability with this Million Trees Initiative, citing that "it's about taking responsibility" (Stewart and Wachtel, 2017). This implementation of this plan was also led by McPherson et al. in 2008 who completed a thorough tree canopy and benefit assessment and measured the feasibility of the project. At the end of former Mayor Villaraigosa's term, his administration had planted a total of 407,000 trees. The city was highly criticized when City Hall siphoned money out of the program and especially because they failed to maintain and manage these trees, which resulted in many trees dying (Stewart and Wachtel, 2017).

There has also been a record low budget for the urban forest for the longest time in Los Angeles to the point where organizations like LA Beautification team, Los Angeles Conservation

Corps and North East Trees have had to tap into the city and even the state budget in an effort to plant trees (Stewart and Wachtel, 2017). In 2014, at the height of the drought in California, Governor Brown issued a "no watering" policy. As a result, leaders in LA encouraged residents to get rid of their lawns and to stop watering trees. Mayor Garcetti and the City Council spent millions of dollars in "anti-drought funds" in the form of "anti-drought rebates" which left parts of LA looking like "gravel yards that one drought-gardening expert called 'inner-city Phoenix" (Maddaus, 2015; Stewart and Wachtel, 2017). Thousands of trees died, which was exacerbated by invasive species and diseases that preyed on weakened or trees that were lacking water (Stewart and Wachtel, 2017). The current state of tree canopy and tree growth in Los Angeles is fragile and lacking, resulting in poor urban and pedestrian infrastructure, which is evident in the inconsistencies in the management of tree canopy cover in LA.

Current Tree Planting Efforts

Current Mayor Eric Garcetti recently revised the Sustainable City pLAn that he had released in 2015, also known as "The Green New Deal." The three key principles to this plan are: "securing clean air and water and a stable climate, improving community resilience, expanding access to healthy food and open space, and promoting justice for all" (Garcetti, 2019). As a part of his goals to contribute to urban ecosystems and promote resilience, this "pLAn" envisions "expanding the tree canopy in areas of greatest need [and] putting more parks and open space within walking distance of every L.A. household" by implementing a 50% increase in tree canopy by 2028 (Garcetti, 2019). This thesis project will provide additional insight on this recent initiative throughout.

Aside from government efforts, strong efforts in tree planting and stewardship today are led by grassroots initiatives. Tree Ambassador is a pilot program that is a collaboration between the city, the non-profit City Plants, and other partner organizations. This program trains local participants in LA "in urban forest issues and practices so that they can help bring more trees into their communities" (Ohanesian, 2021). In nine months, Tree Ambassadors meet for ten training sessions and cover topics like community organizing and how to find the perfect tree for a certain space (Ohanesian, 2021). The main goal of this program is for these ambassadors to share the knowledge beyond their own communities and to help prepare those who are interested in urban forestry careers. Tree People is similar to the other community stewardship programs in which it also works between the policy and grassroots level to "facilitate actionable research and science-based policies, incentives, and applicable demonstration programs to transform Southern California utilizing nature-based solutions" (treepeople.org). North East Trees's mission is to "bring nature back to our urban environment" by improving urban infrastructure through stormwater management, landscape improvements and park designs, urban forestry, watershed rehabilitation, as well as youth and community stewardship.

This thesis project will provide insight on how much progress has been made since former Mayor Villaraigosa's abandoned Million Trees Initiative, and will evaluate the current needs of the pedestrian infrastructure in LA as indicated by tree canopy cover.

CHAPTER 3

IMPORTANCE OF TREES

Why are trees important?

Considerable research has been conducted on how tree canopy cover (TCC) affects the aesthetics of a street or a neighborhood. Research has also shown that the existence of a high percentage of TCC is also correlated with the reduction of environmental hazards which reduces public health threats such as asthma and heat-related illnesses. There is ample evidence that neighborhoods with higher housing prices and costs of living have more trees and tree coverage overall. In addition to contributing to property value, tree cover is also projected to add value to the physical makeup and the infrastructure of cities, which can be shown monetarily. The problem is that particularly in urban neighborhoods with residents of lower income and in communities of color, public access to green spaces and tree cover is especially limited. This access is especially important because residents and civilians' public health and wellbeing are being directly impacted by tree canopy cover, which will be overviewed in this chapter.

Environmental Benefits: Heat Island Effect

Tree canopy provides great environmental benefits to residents and civilians which are especially pertinent in the times of catastrophic climate change. The first major benefit is that tree canopy reduces the implications of the heat island effect. According to the US Environmental Protection Agency (US EPA), "Heat islands are urbanized areas that experience higher temperatures than outlying areas." In the city, human-made structures such as buildings, roads, sidewalks, and other infrastructure absorb and reflect heat from the sun more than forests and large bodies of water (US EPA, 2021). As a result, urban spaces with high concentrations of such structures and concrete jungles become "islands" that trap heat and generate higher temperatures relative to areas outside of the island. By contrast, "shade trees and smaller plants

such as shrubs, vines, grasses, and ground cover, help cool the urban environment" (US EPA) since they provide actual cover over the concrete that would otherwise trap in heat. This is why tree canopy, with large amounts of trees and foliage, is extremely effective in curbing the effects of heat islands. Depending on the size of the tree, the leaves and branches that are on trees absorb anywhere between 70-90% of the sun's energy, which is used up for photosynthesis to feed the trees themselves (US EPA). Only 10-30% of the sunlight would reach the area under the tree, which is a significant reduction in what sunlight would hit the ground if the trees were not there to provide shade and cover. In addition to absorbing sunlight and providing shade, trees also naturally go through the process of evapotranspiration in which the tree turns water from the atmosphere into vapor--naturally cooling the air in the immediate surrounding areas (USDA).

Environmental Benefits: Infrastructure and Energy Consumption

By providing shade to residential buildings and the ground in general, the air temperatures are lowered. The shade of one single tree can already provide immense relief from the hot summer sun. However, with an adequate amount of tree cover, summer temperatures could be lowered by as much as 10 degrees Fahrenheit (ScienceDaily). This would lead to an overall reduction in the use of air conditioning, which would directly result in reduced electricity use (McPherson et al., 2008). Additionally, the estimated emission reductions at power plants that are associated with the effects of trees on energy use in buildings are greater than the natural biological carbon sequestration processes done by the trees themselves (McPherson et al., 2008). Tree cover does not only provide residents and civilians with shade and relief, tree cover also reduces carbon emissions, which reduces the amount of CO2 that is added to the positive feedback of global warming.

Trees' leaf canopies also help reduce erosion. The leaves and branches provide surface area for raindrops and water to land and evaporate. From an infrastructure perspective, this is especially important as trees can also help reduce stormwater runoff and protect water quality when they intercept rainfall in their crowns. It is proven that "the average annual interception rate per tree ranges from a low of 102 gal to a high of 1,481 gal based on tree size, rainfall amounts, and foliation period" (McPherson et al., 2008). Any water that does not get soak up by trees or natural ground cover runs off and travels down the slope to the nearest body of water (i.e. rivers, streams, lakes, oceans), carrying along any harmful pollutants that it may pick up as it runs through the urban landscape (ncforestservice.gov). For the water that does end up on the ground around the trees, the roots would take up the water and the surrounding natural ground cover and soil becomes an environment that filters the water of pollutants such as phosphorus and nitrogen which usually come from sewage runoff (US EPA).

Public Health Benefits

Trees also play a significant role in purifying the air. Trees intercept small particulate matter (PM10) and take up ozone (O3) and nitrogen dioxide (NO2) (McPherson et al., 2008). These compounds make up the daily air pollution that we see manifested as the haze that covers Los Angeles on a semi-daily basis from high amounts of vehicle emissions (Barboza, 2020). For a populous metropolitan city like Los Angeles with a lot of trailers and vehicles on the road and an industrial landscape dotted with factories, air pollution is unavoidable. This is concerning for residents and commuters of LA since nitrogen dioxide is especially harmful to human health in terms of negatively affecting lung functions such as increased inflammation of the airways, worsened cough and wheezing, reduced lung function, increased asthma attacks, and greater likelihood of emergency department and hospital admissions (American Lung Association).

Trees have the capability to curb air pollution by "absorb[ing] odors and pollutant gases (nitrogen oxides, ammonia, sulfur dioxide and ozone) and filter particulates out of the air by trapping them on their leaves and bark" (treepeople.org).

Studies have demonstrated that an increase in urban tree canopy was related to better overall health mediated by conditions such as obesity, type II diabetes, high blood pressure (Mitchell and Popham, 2008; Pretty et al., 2005; Ulmer et al., 2015), and asthma (Ulmer et al., 2015). The appearance of trees and green spaces is also found to promote mental health (Huynh et al., 2013; Kardan et al., 2015; Richardson et al., 2013), reduce stress (Grahn and Stigsdotter, 2003), and enhance psychological and cardiovascular benefits (Pretty et al., 2005). The natural and built environment also influences humans' outdoor physical activities. Evidence-based research has shown a correlation between parks and recreation spaces in promoting physical activity (Kaczynski and Henderson, 2007), which also brings up the concern of access to such spaces. In a study done on the large urban center of Toronto, Canada with individual tree data from the city and self-reports of general health perception, it was found that having 10 more trees in a city block, on average, improves health perception in ways comparable to an increase in annual personal income of $10,000 and moving to a neighborhood with $10,000 higher median income or being 7 years younger (Kardan et al., 2015). From this, we can gather that the integration of trees in a neighborhood has the potential to promote health and physical wellbeing in the same way that having a significant increase in income would bring about change to one's personal life.

Aesthetics, Property Value, Financial Gain

In a study done by McPherson et al. on the feasibility of *The Million Trees LA* initiative, the researchers also estimated future benefits and placed a monetary value on the potential gains that will come with each new tree planted. McPherson et al. placed monetary value on these following benefits from tree cover: energy savings, atmospheric carbon dioxide reductions, air quality benefits, stormwater runoff reductions, aesthetics and others. The annual benefits and monetary values were calculated and summed for a 35-year period using numerical models with geographic data and tree size information. The total monetary values of the benefits that comes with planting a million trees in LA are measured to be "$1.33 billion and $1.95 billion for the high- and low mortality scenarios, respectively. These values translate into $1,328 and $1,951 per tree planted, or $38 and $56 per tree per year when divided by the 35-year period" (McPherson et al., 2008).

Trees also play a large role in maintaining the image and the aesthetics of a space. According to the same study, "aesthetic and other benefits ranged from $1.1 to $1.6 billion, or $1,100 to $1,600 per tree over the 35-year period for the high- and low-mortality scenarios" (McPherson et al., 2008). This amount makes up a majority of the value for all of the benefits combined, which is reflective of "the economic contribution of trees to property sales prices and retail sales, as well as other benefits such as beautification, privacy, wildlife habitat, sense of place, and psychological and spiritual well-being" (McPherson et al., 2008). Many studies have proven that trees and other landscaping can increase property value, an increase of anywhere between 3 to 10% (Theriault et al., 2002; USDA). It has been found that shopping centers that have landscaping would be more prosperous than those without, since shoppers may stay longer to purchase more given the more aesthetic, pleasant, and shaded environment that comes with

trees and landscaping (USDA). A property manager of a shopping center explained that "Planting and landscape draw a lot of people…We wouldn't have what we have without plants." Trees can also bring about new dimensions and dynamism to the street, especially as the time changes with the seasons (Wolf, 1998).

According to Wolf, plants, greenery, and trees in general help a space create a visual identity and a sense of unity (Wolf, 1998). Since plants and landscaping require careful consideration of the space in order to figure out the composition of the landscaping project, the process comes with care and attention to detail. This may communicate "a message of care" to visitors in which "a well designed and maintained street landscape suggests the level of attention that a consumer can expect from a business." This may make for a memorable experience for visitors and shoppers, and therefore may keep them interested and returning, which points to the important role that trees play in moderating our surrounding environments.

It must also be noted that there is a common misconception that LA is a "desert," which may be due to the way that LA has historically branded itself as a tropical destination and a desert oasis to attract tourists. There is a lot of work to be done to restore and maintain what is left of LA's native landscape, which is a semi-arid, chaparral, sage scrub, and oak woodland landscape (Masters, 2011).

CHAPTER 4

WHY LOS ANGELES

The City of Los Angeles

The large metropolitan city of Los Angeles was chosen as the main study location for this project for a variety of reasons. The first reason is because of its proximity to the Claremont Colleges. It is a city that is reached y easily from the city of Claremont if one looks past the long smoggy traffic. The City of Los Angeles is a geographically large sprawling city, totalling 503 square miles. The city itself is made up of 15 council districts, which in 2021 is being redrawn in the redistricting process that occurs every decade (City News Service) and comprises 95 different zip codes (zipcode.org). LA is one of the most diverse cities in the United States, ranking as #1 most diverse city in the U.S. in 2015 (Wells, 2015). The City of Angels has the largest communities of Koreans, Iranians, Thais, Mexicans, and El Salvadoreans outside of their home countries (Wells, 2015). Given the large geographic area that is Los Angeles and a highly diverse population, the city is home to many ethnic enclaves, including one of the three only Japantowns in the entire country. Cultural spaces and communities like Little Tokyo, Koreatown, Chinatown, and Little Armenia are often sites for tourism, but are also highly frequented by locals around the LA region. The diversity in LA contributes to a compelling narrative for this project.

However, diversity does not mean inclusivity. For example, “Long Beach, which ranks fifth on the U.S. News diversity index, struggles with racial residential segregation and high poverty rates for Hispanic and black residents” (Galvin, 2020). Long Beach is its own city adjacent to LA, but is still within the boundaries of LA County. For cities like Los Angeles and others in the surrounding area, housing affordability is a major concern. According to Meixell and Stacy, while a city may appear inclusive, small racial opportunity gaps do not always tell the full story. In some cases, they may indicate that the lowest-income people of color have been excluded or displaced from the city” (Meixell and Stacy, 2020). Housing, income, and education

gaps are some ways that racial and economic inequality is pronounced in large metropolitans like Los Angeles. This project on TCC will illuminate some of these inequities.

Redlining in LA

Another major reason why LA was chosen as the site for this study was because of its long history of redlining. Redlining is defined as an illegal discriminatory practice in which a loan or insurance is denied someone because the area that they live in is deemed to have high financial risk–often determined by the racial and ethnic makeup of the neighborhood. As part of Franklin D. Roosevelt's New Deal after the Great Depression, the Home Owners Loan Corporation (HOLC), Federal Housing Association (FHA), and Federal Home Loan Board Bank (FHLBB), the federal government crafted a national set of standards for assessing mortgage risk (Reft, 2017). The goal was to make it easier for American working-class citizens to buy homes and properties without being burdened by large down payments. These "national standards" came in the form of a rating scale with letter grades from A to D. The ratings were as follows: "Communities with A ratings represented the best investments for homeowners and banks alike; B, neighborhoods that were still desirable, C, those in decline, and D, areas considered hazardous" (Reft, 2017). The HOLC also created color-coded maps to visualize these standards in a geographic scale, using green for A, blue for B, yellow for C, and red for D, which is where the term "redlining" originated (see fig. 1). Unfortunately, the goals and the intentions behind creating these standards did not match the consequences and implications as a result of this system. A critical reading could suggest that these maps and redlining achieved exactly what the government had hoped for, which is to keep certain communities of color out. The communities coded red on the map usually consisted of minorities during that time: African-Americans,

Mexican-Americans, Asian-Americans, and sometimes newly arrived immigrant groups like Slavs, Jews, and Italians (Reft, 2017).

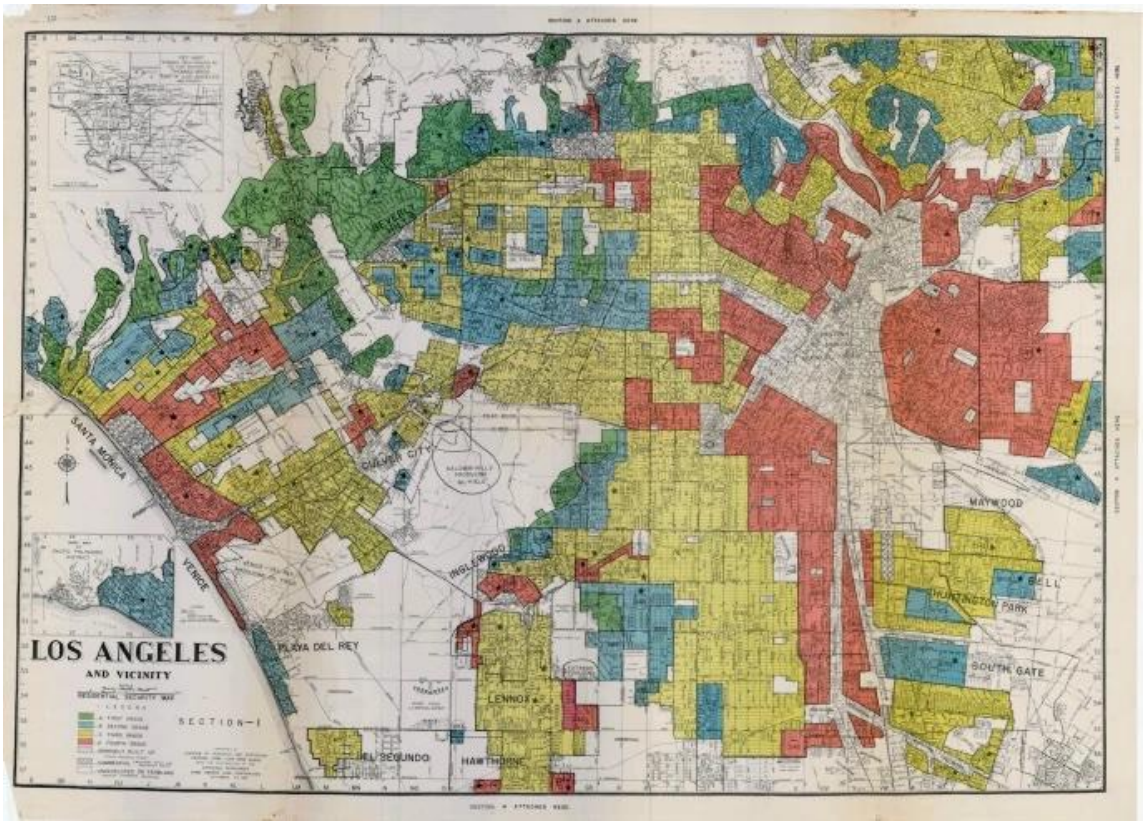

Fig. 1: 1939 HOLC "redlining" map of central Los Angeles, courtesy of LaDale Winling and urbanoasis.org.

Working class white communities were a bit better off, but they were still penalized and received ratings of C and even D. Communities subjected to redlining struggled to receive federally backed home loans, which made property ownership difficult for residents. Even getting approved for loans for home improvements such as maintenance and renovation was an unlikely occurrence, which drove neighborhoods into “a vicious circle of decline: the inability to access capital [led] to disrepair and the physical decline of a community’s housing stock, which in turn reinforced the redline designation” (Reft, 2017). Redlining became directly linked with race and class segregation that also reinforced stereotypes that prohibit the same neighborhoods and residents from progressing and achieving upward mobility today.

This system of redlining drew investment away from these communities, which is an impact that remains visible, especially in sectors like East Los Angeles. Statistics show that "Lincoln Heights and Boyle Heights have some of the lowest rates of homeownership in Los Angeles County" and that "they rank 25th and 26th out of 272 neighborhoods in LA County with 75.9% of their populations being comprised of renters." These are the same neighborhoods that were once rated with a D and redlined by the HOLC (Tijerina, 2019). These same neighborhoods are also considered as "ground zero" for gentrification in LA. This is especially problematic as there is "an understood nature of impermanence to renting" in which renters are vulnerable to volatile rents and illegal and abusive actions done by landlords. In fact, it is proven by the U.S. Census Panel Study of Income Dynamics (PSID) that renters are twice as likely as homeowners to experience displacement as a result of gentrification (Tijerina, 2019). The housing crisis that plagues LA is characterized by a lack of affordable housing and high rates of homelessness that is exacerbated by high rents and the historical inequities in the development among neighborhoods. The lasting effects of redlining is also made visible through the analysis of TCC in the following Chapter 5.

CHAPTER 5

GIS ANALYSIS OF TCC IN LA

What is GIS?

GIS stands for Geographic Information System, which is "a spatial system that creates, manages, analyzes, and maps all types of data" (Esri). GIS is a data visualization tool and connects data to maps. Esri, which is the global leading GIS company and software, prioritizes "integrating location data (where things are) with all types of descriptive information (what things are like there)" (Esri) as a form of knowledge creation and insight generator. GIS is commonly used in science and can be used and applied in every industry to improve communication, efficiency, management, and decision-making.

This powerful data visualization tool helps users and audiences understand patterns and relationships in a geographic context through the creation of maps. GIS is especially powerful because the products, or maps, that are created are generally widely accessible. Once the data is analyzed and processed onto maps, the maps themselves are easy to share, easily digestible, and understandable virtually and by everyone. According to Sarah Williams, Associate Professor of Technology and Urban Planning at the Massachusetts Institute of Technology (MIT) and the Director of the Civic Data Design Lab, "Sharing data helps the public have access to information, acquire knowledge, and ultimately make better civic decisions; sharing data through visualizations can communicate the insights of data without asking everyone to be a data scientist" (Williams, 2020). This is especially important for a project of this scale because it is easy for knowledge to be limited and only made accessible to those associated with the academic setting. Mastering the communication of a research finding is what makes a (thesis) project the most successful. The goal in using GIS as a tool for this thesis project was to make this project digestible, accessible, and interactive for all those who come across this work.

The Use of Data

Data are easily manipulated by humans and this manipulation can have large implications and impacts. This means that "people bring their views of the world to the analytics and can create widely divergent results, both good and bad" (Williams, 2020). Data analytics and the insights that have been generated through visualizations have contributed a lot to the world, from stopping disease to exposing human rights violations. However, data can also be extremely harmful and exclusionary to marginalized groups such as women, the poor, and certain ethnic groups (Williams, 2020). Depending on what hands the data ends up in, the data can be manipulated to generate wildly different visuals according to different people's visions of the world.

This is why it is especially important to address my biases coming into this project. I am an immigrant and first-generation low-income (FLI) student at a predominantly white institution (PWI) who has a strong interest in urban studies. My background heavily influenced my interest and drive for this thesis project, which combines my passion for urban planning, public health, environmental science, and environmental justice. My mission throughout my entire academic journey at the college has been to understand how the realities of environmental issues such as climate change and global warming affect people differently across the world. By producing this thesis project, I hope I can contribute to the growing dialogue of the history of environmental racism in Los Angeles and in urban planning in addition to shining light on the communities that are the most vulnerable to the consequences of climate change.

Data and Methodology

I used a series of different databases to conduct this research. First my *tree cover data* was retrieved from the City of Los Angeles's geohub (Burke, 2020). This was a polygon feature layer already created by officials from the city. What I did was symbolize it to make it fit what I want to show my audience. For my analysis, I chose to focus on *household income, home value, racial demographics, and poverty rates*. These layers were retrieved from Esri. The *household income* data *poverty rates* data were also sourced from Esri's Living Atlas. However they were generated by the American Community Survey (ACS). I also overlaid tree cover data with *Los Angeles Urban Density* rating layer. This layer was found on Esri's ArcGIS Online, but was created by an urban density assessment from the city. An important note is that the urban density ratings were only available for certain areas of the city, not the entire city of Los Angeles. My last piece of analysis was conducted by using a *disadvantaged communities* layer from CalEnvirosScreen (BIOS Admin).

The bulk of this research was done on ArcGIS Pro. First, the tree cover layer was added to my map. This layer was not created by me, so I had to change the symbology to graduated colors as it came as a single color polygon layer. I selected the field for "TC Existing Cover" to display the existing amount of tree cover in the city of Los Angeles. I also enriched this data with racial demographics. Next, I started to search for the layers that would give me demographic information. I added a layer on Average Household Income from Esri Living Atlas. After that, Average Home Value was added, along with another layer displaying the Poverty Rates. Each of these layers were large and gave me data from the entire country. Thus, I had to do definition queries for each of these layers so that I could select for the data in the state of California and in the City of Los Angeles. I then symbolized each of these layers with graduated symbols. I had a

lot of difficulty with this part, because there were many overlapping symbols and I wanted them to be clear for my audience.

Another angle of analysis was looking at the urban density rating of the entire city. I added this layer called the Los Angeles Urban Density, which ranked select neighborhoods in LA with the grade A-D, with A being neighborhoods with the least density and the "best" living condition, and D being neighborhoods that are the most dense and not the most desirable living conditions. I made sure these were symbolized with graduated colors as well, with the green-red gradient to reflect the urgency of these rankings. I must note that this layer does not include data from the entire city, only certain areas of it. Therefore, I clipped the tree cover layer to match the urban density data. For this analysis, I symbolized the tree cover data with graduated symbols so that my audience could see the percentage of tree cover on top of the polygons showing the urban density ratings. For the layers that I added to this analysis (poverty rates and disadvantaged communities), I had to clip them to match the data of the urban density rating layer as well.

For the actual analysis, I looked at the areas with the lowest ranking (C or D), and created a definition query to select for those areas. I then clipped the poverty rates layer to analyze what areas that were poorly ranked had the highest number of people whose 2017-2018 income is under the poverty level. My last layer of analysis was looking to see which communities were labeled as "disadvantaged." I overlaid the areas of C or D ranking with disadvantaged communities layer and clipped it to the areas with C or D ranking to conduct that analysis.

Results and Findings

All in all, my results confirmed that of the previous studies. These maps also reveal that there is much more work to be done to increase tree canopy in LA, as there has not been much

progress since the Million Trees Initiative in 2008. According to this first image below, areas with lower tree coverage are concentrated in South Los Angeles (Fig. 2). This also correlated with income level and home value. Areas of low tree cover correlated with an overall lower average household income (Fig. 3), and also a lower home value (Fig. 4). The tree cover layer was enriched with racial demographic info which is not displayed in these images.

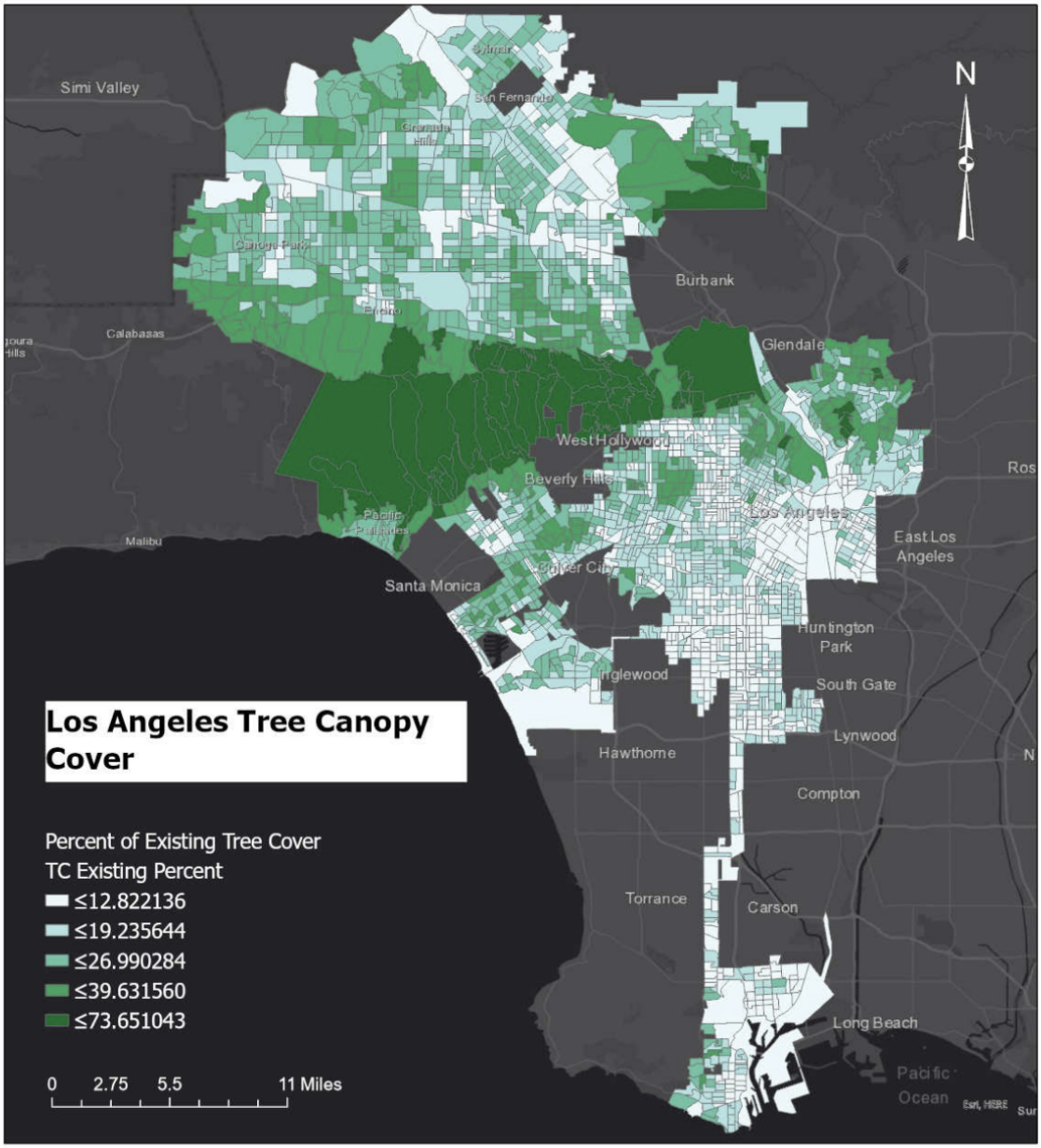

Fig 2: GIS map of existing percentage of TCC in Los Angeles with lower average rates concentrated in South LA. Map created by Hoi Cheng Wong via ArcGIS Pro.

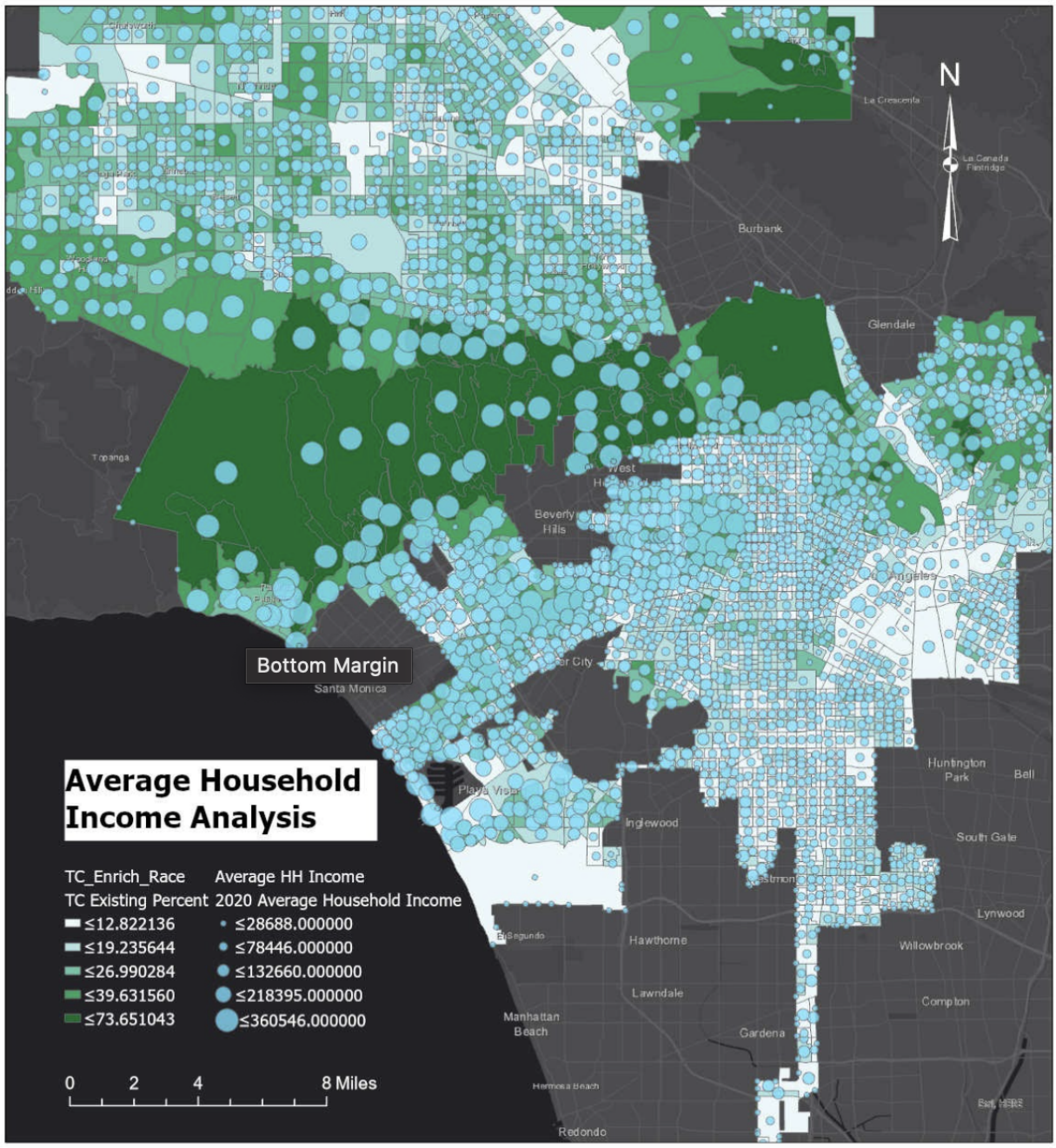

Fig 3: GIS map of Average Household Income statistics (in blue symbols) overlaid on existing percentage of TCC in Los Angeles. Map created by Hoi Cheng Wong via ArcGIS Pro.

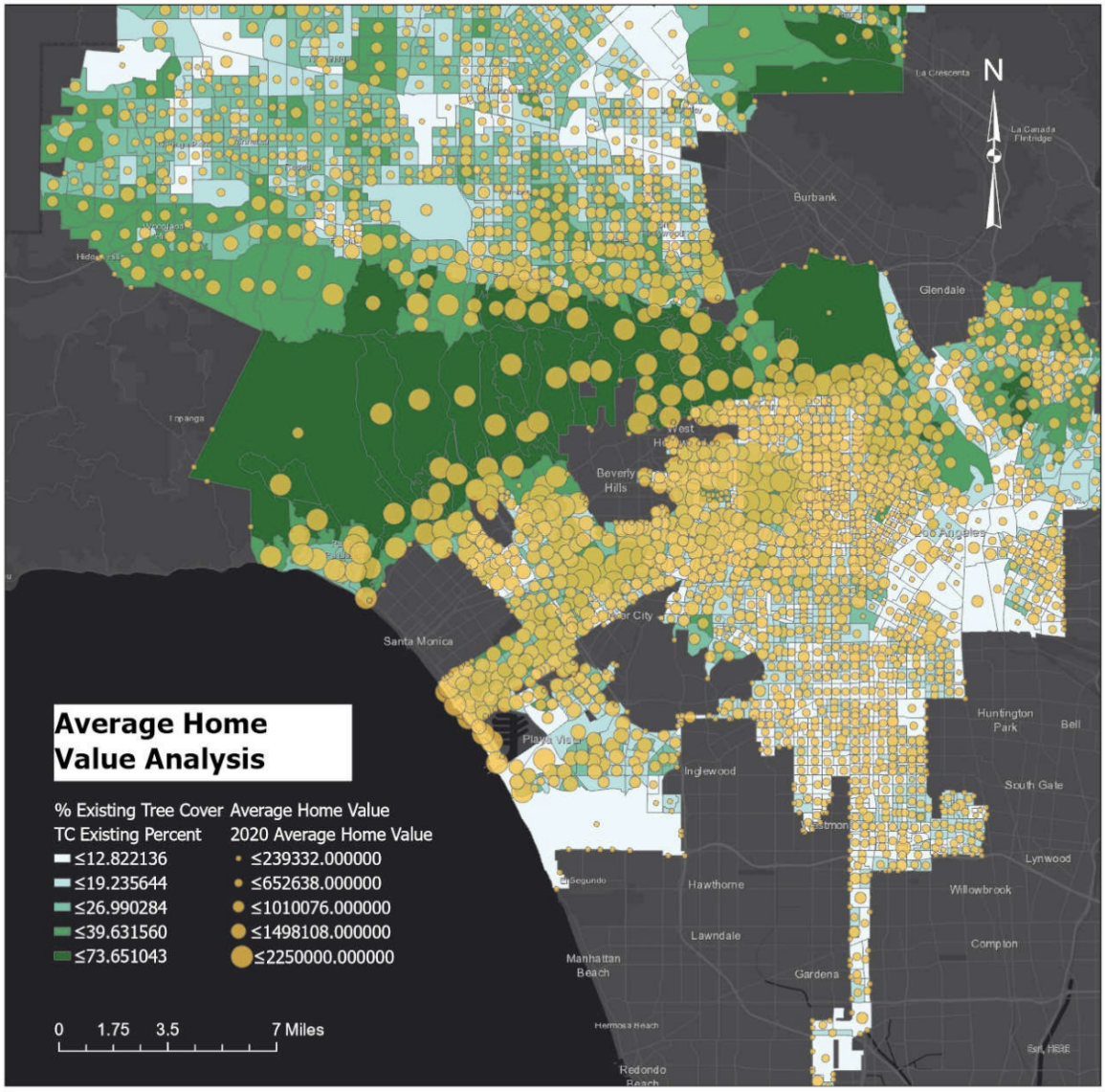

Fig 4: GIS map of Average Home Values ($) in Los Angeles overlaid on top of existing TCC in LA. Map created by Hoi Cheng Wong via ArcGIS Pro.

In this next graphic (Fig. 5), the results from the urban density rating and tree cover analysis is displayed. According to the Encyclopedia of Quality of Life and Well-Being Research, Urban Density is defined as "a concept used in city planning, urban studies, and related fields to describe the intensity of people, jobs, housing units, total floor area of buildings, or some other measure of human occupation, activity, and development across a defined unit of area" (Hess,

2014). In other words, urban density refers to the degree of concentration or the compactness of people and development in a city. There is a clear correlation between low tree cover and lower urban density rating. On the map, this means that the streets of the areas with a C or D rating may look less maintained and are determined to be “less desirable” in comparison to areas with A or B rating and higher tree cover percentage, which reveals the HOLC maps and ranking system that was created in the mid-1900s hold strong legacies in LA that are still visible through the variations of tree canopy across the city.

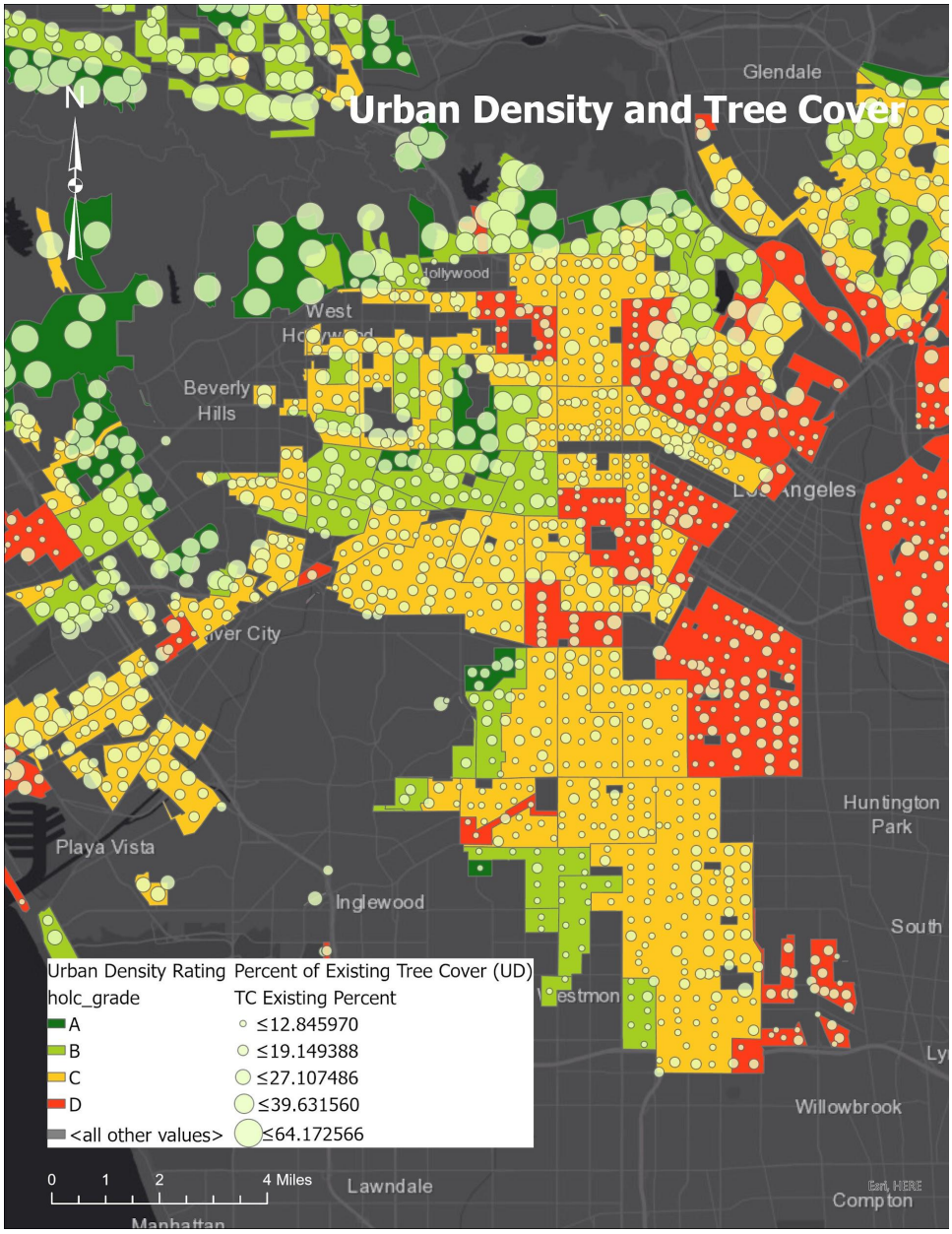

Fig 5: GIS map of Urban Density in Los Angeles overlaid with existing TCC in LA. Map created by Hoi Cheng Wong via ArcGIS Pro.

For the next three graphics below (Fig 6-8), I have conducted an analysis of poverty rates with the areas of lower urban density rating (Fig. 6). In the areas with C and D rating, there is a positive correlation with higher rates of poverty (Fig. 6 and 7). The regions in Figure 7 with the

darker colors indicate the highest rates of poverty in all of Los Angeles. The tree cover symbols are extremely small in Figure 6, which allows us to conclude that the areas with the highest rates of poverty also have the lowest tree cover. At the same time, these areas are the ones that are the most disadvantaged, according to CalEnviroScreen, which is where I retrieved the data from for Figure 8. Most of the C and D rated neighborhoods are designated as "Disadvantaged" (Fig. 8).

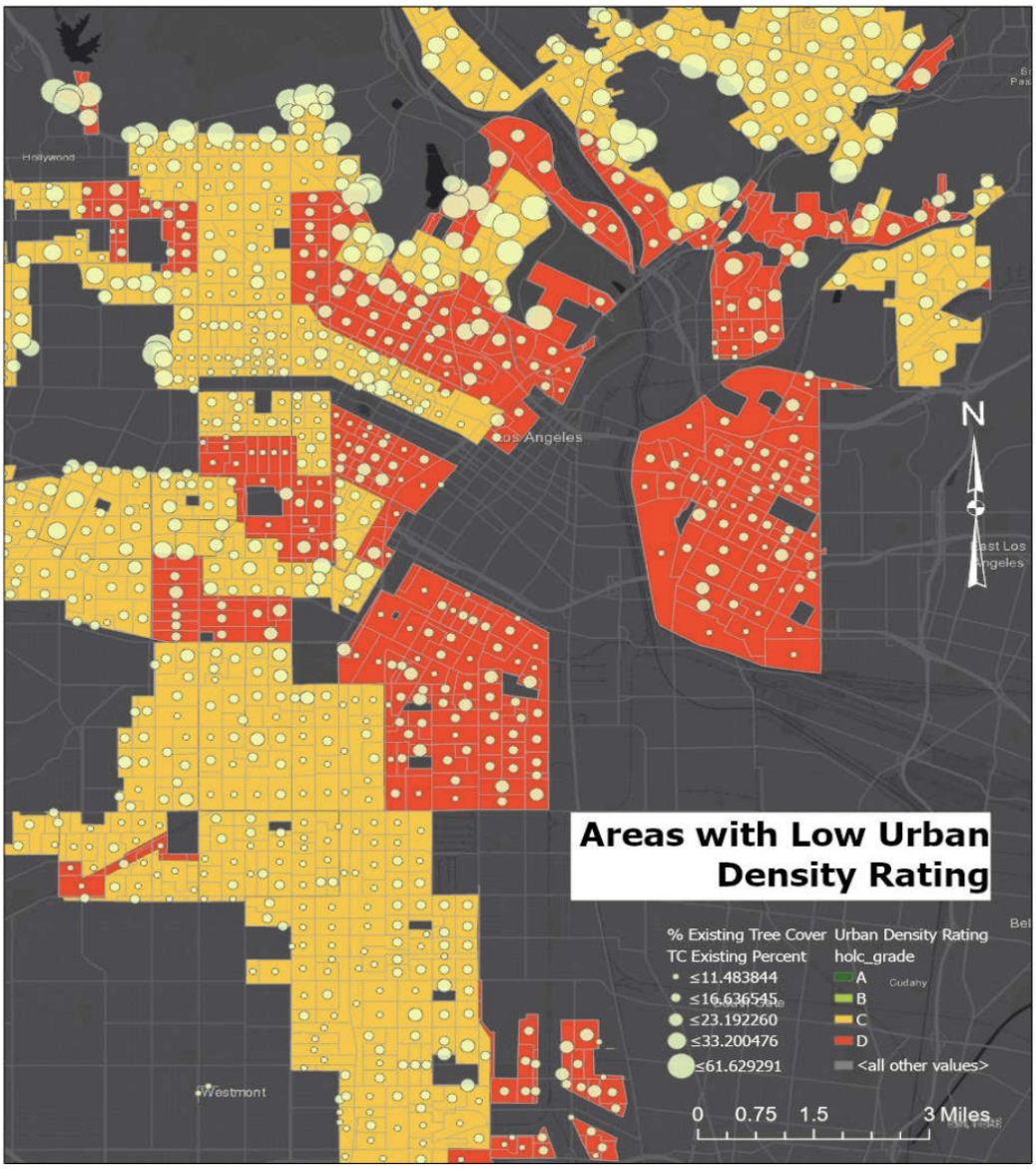

Fig 6: GIS map of areas in Los Angeles with low urban density rating with percentage of existing TCC overlaid on top. Map zoomed into South LA as majority of C and D ratings are concentrated there. Map created by Hoi Cheng Wong via ArcGIS Pro.

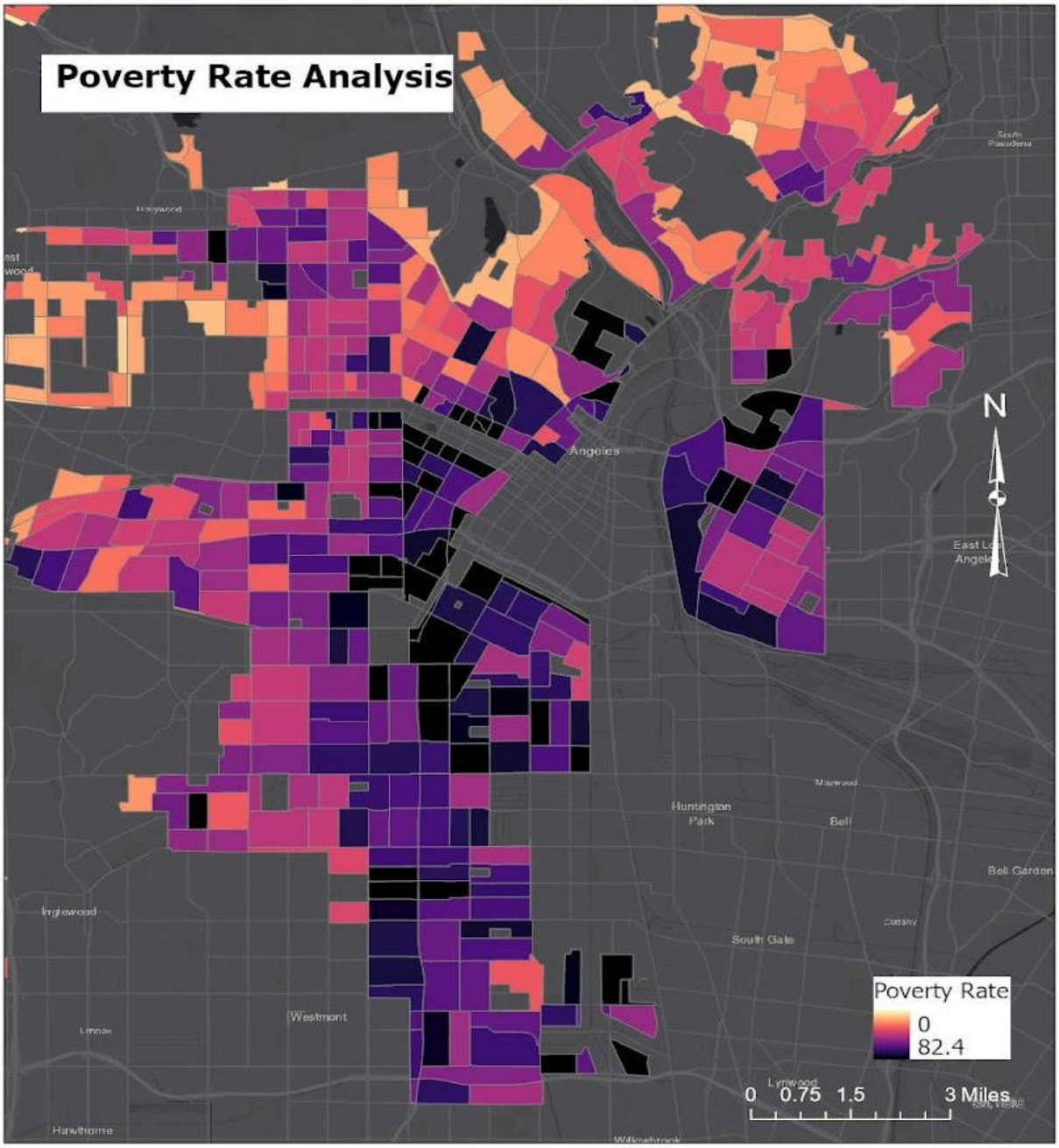

Fig 7: GIS map of poverty rates in South LA. Map zoomed in to focus on the South LA region. Map created by Hoi Cheng Wong via ArcGIS Pro.

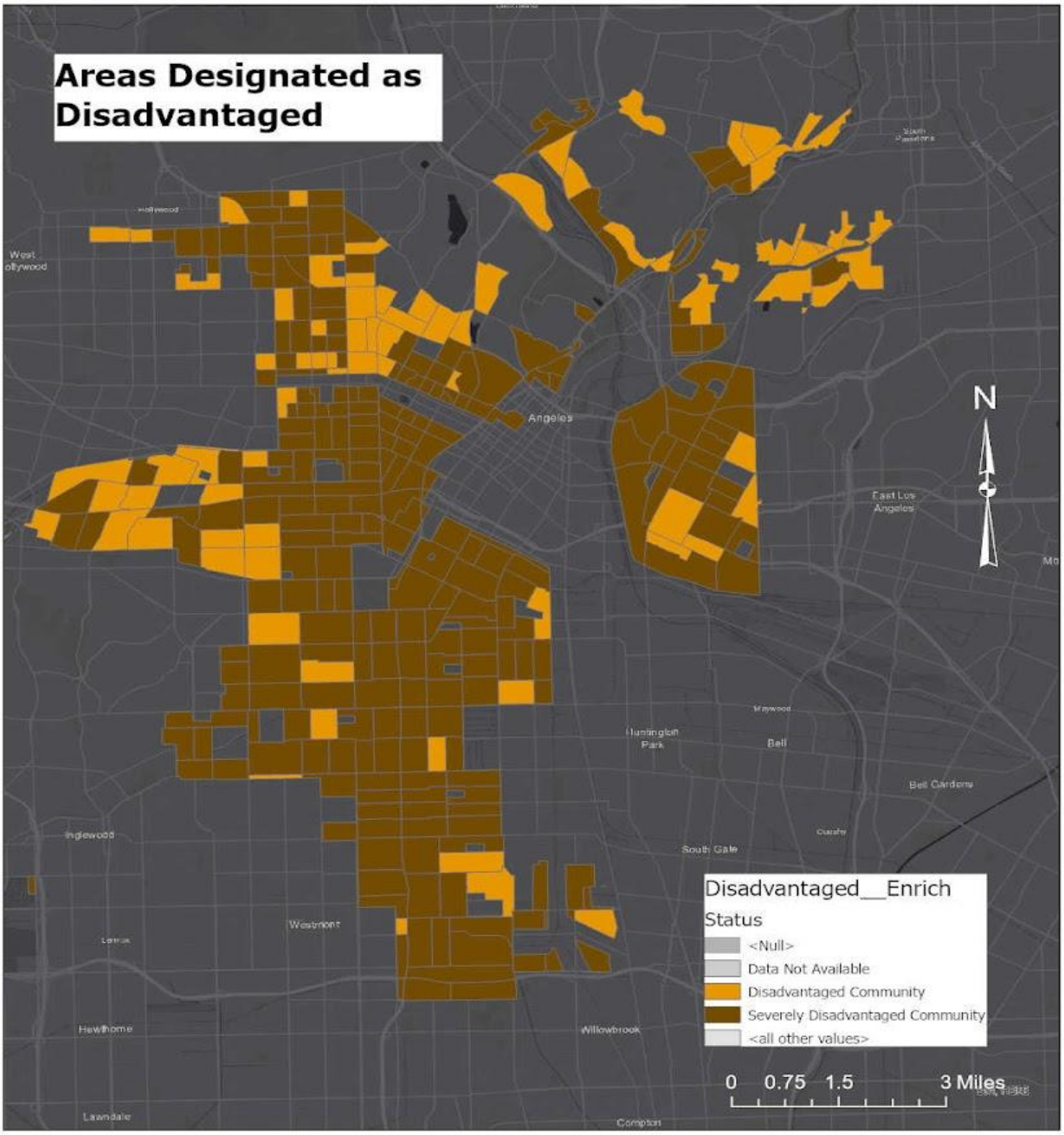

Fig 8: GIS Map of areas designated as "disadvantaged" according to CalEnviroScreen. California OEHHA defines 'disadvantage' as "the top 25% scoring areas from CalEnviroScreen along with other areas with high amounts of pollution and low populations" (Monserrat, 2015). Map created by Hoi Cheng Wong via ArcGIS Pro.

Conclusions

In conclusion, tree canopy cover correlates with socioeconomic status of the residents living in the area. The analysis found that regions in South LA have the largest area with the least tree canopy cover out of Los Angeles. This means that they will be the most susceptible to public health threats, and would be the most at risk of health conditions related to extreme heat and climate change. This disparity demands immediate care and considerable attention as the lack of trees is a result of decades of marginalization. The longer these needs are neglected, the more difficult it would be for these communities to get out of these cycles of disinvestment. Tree canopy cover, or the lack thereof is a visual manifestation of the lack of care and interest that the city has in the wellbeing and livelihoods of the residents living in South LA. The areas of need indicated by the lack of tree canopy cover would also be areas identified as the most vulnerable, and most need attention in terms of the maintenance of public infrastructure such as roads, buildings, parks, and specifically existing tree cover. The City of Los Angeles should definitely pay more attention to areas in South Los Angeles and invest more in protecting these communities from their increased risk of public health issues and to help residents maintain their overall health and wellbeing.

According to the context and history of Los Angeles, neighborhoods in South LA also have been the ones most subjected to redlining as mentioned in Chapter 4. The lack of tree canopy in neighborhoods of South LA may have been a direct result of the historic lack of maintenance and care of the infrastructure in those neighborhoods. Additionally, a pattern of disinvestment and neighborhoods in decline only further disincentivizes any institutional effort to invest and rebuild the area.

Further GIS research could include data on renters, rent value, and percentage of renters in Los Angeles, as a large portion of the housing in the city is rental. Data on publicly accessible parks and greenspaces would also be helpful. Additionally, adding a layer summarizing predominant races and ethnicities of the residents would help me expand my equity research and would make this research more applicable to the realm of environmental justice and the topic of environmental racism. At the time of this GIS project, the research was out of the scope of my project as I had many indicators to examine.

CHAPTER 6

CONTEXT FOR WALKING IN LA

The Importance of Walking

All of the data displayed and all of the context established in the previous sections are further ground-truthed and rooted in the walking ethnography and case study of Vermont Avenue in LA. It was especially important for me to personally conduct this fieldwork in the actual city rather than just looking at raw data, maps, GIS visualizations, or reading about tree canopy because I wanted to get a feel of what it is like to be in the city that actively lacks tree canopy cover. Drawing from Lee and Ingold's perspectives on "Fieldwork on Foot," "walking affords an experience of embodiment to the extent that it is grounded in an inherently sociable engagement between self and environment" (Lee and Ingold, 68). I went into the field to conduct fieldwork on two separate occasions and each experience offered me deep connections to the subjects that I was studying, reading, and writing about. This "engagement" allowed me to create my own meanings according to my personal observations across time and space. According to Lee and Ingold, walking is "...both embodiment and participation presuppos[ing] some kind of attunement" (Lee and Ingold, 67). This highlights the importance for researchers to be present and attentive to whatever and whoever they are studying and to follow through every step of the way of the research in order to begin to understand the lived experiences of pedestrians and residents. This "participation" does not automatically clear me from any of my personal biases or any power dynamics that I may carry with me as a student researcher and ethnographer. Lee and Ingold explains that walking situates the ethnographer and ensures that the "ethnographer's pedestrian movements and those of the people she or he is with are grounded in shared circumstances" (Lee and Ingold, 67).

While walking down Vermont Avenue, I also photographed the natural materials that caught my attention with the hopes of enhancing my project with the images from the field.

Anthropologist Cheng Yi'En explains that "... fieldnotes and video-recording techniques are important tools to be deployed alongside walking in order to apprehend affective, ineffable, and mundane moments in the field" (Cheng, 2014) and that walking and documenting simultaneously puts "...a focus on the 'everyday' socio-spatial aspects of cities directs our attention to the creativity of ordinary urban dwellers and the fragmented spaces that nevertheless constitute urban life" (Cheng, 2014). Only when you are on foot in the city can you truly control (to a certain extent) the pace at which you move, with your experience enhanced by "the sensorial aspects of our bodies such as seeing, hearing, and feeling" (Cheng, 2014). While I was in the field, I was able to pause to take a second look and to take a quick shot of whatever piques my attention, which is what Cheng describes as "objects in the urban space that disrupt the rhythm of walking [with] their power to affect our spatial orientations, as well as to capture our attentiveness to their weighty existence" (Cheng, 214). In the case of this project, these "objects" are trees in varying conditions, different stages of growth, and different levels of maintenance. Walking on the street gave me the opportunity to see that these trees are not mere objects that blend into the landscape in passing, but they are very much literally alive and demanding for our attention and care. Cheng also defines these "objects" as "urban materialities," or "affective materials for organizing mundane experience" (Cheng, 212). From that, whether or not trees are deemed as "ordinary" to the average human experience in an urban landscape is subjective, but throughout this project I will propose that trees enhance the walking experience in the city.

Why Vermont Avenue?

Vermont Avenue was chosen as the street as the main case study for the purpose of this project because the avenue presents a unique gradation of different neighborhoods in a straight

line that barrels straight through the City of Los Angeles. Vermont Avenue is also one of the longest north/south running streets in the entire city and county, with a length of 23.3 miles. It runs parallel to the Harbor Freeway, or Interstate 110. This street runs through various neighborhoods, with its northernmost point at Griffith Park, and its southernmost point in San Pedro, which made it an especially compelling street for this project. Case studies and walking ethnographies were conducted at four different sites of study: the northernmost point, southernmost point, and two points in between which were Koreatown and the University of Southern California campus. These four study sites were chosen for their demographic, economic, and cultural variation. A total of about 7 out of the 23 miles of Vermont Avenue was covered, and each individual site produced significantly different findings in terms of tree canopy cover. Photography was the main mode of documentation, and by default, the process of sorting and categorizing the 370+ photos that were taken became a part of the analysis. All of this field observation was realized by walking.

The walking ethnography and the exploration was done on two separate days, October 29th, 2021 and November 12th, 2021. Both days were Friday afternoons, during the business week. The weather was hot and sunny on both days with highs of 82 and 91 degrees fahrenheit respectively. On Day 1, ethnographic observations were made in the stretches of Vermont between Los Feliz and Koreatown and by the USC campus and Exposition Park. Day 2 observations were made between the Griffith Park and Hollywood Boulevard stretch of Vermont and the southernmost point of Vermont Avenue, which was in San Pedro. These distinct sites of study resulted in unique observations that were only made possible by walking.

The first study site is the northernmost end of the street in the Los Feliz neighborhood and Griffith Park area. The next point of observation is Koreatown, in which its eastern border is

drawn by Vermont Avenue. Geographically speaking this stretch started up north in Griffith Park from the intersection of Vista Del Valle Dr and Vermont Ave to the intersection of Vermont Ave and W Pico Blvd, which totalled 5.1 miles. From Koreatown, I commuted to the University of Southern California, which is bordered by Vermont Ave on the west. I walked Vermont along the western edge of the campus all the way down to Exposition Park, which is also bordered on the west by Vermont Ave. This stretch started at the intersection of W Jefferson Blvd and Vermont Ave and extended for 1 mile to the intersection of Vermont Ave and W Martin Luther King Jr Blvd. The last point of observation is not in the City of Los Angeles, but actually in San Pedro.

Because Vermont Avenue is so long, its southernmost end is in the San Pedro and Wilmington area, which is an entirely different landscape that contributed different layers of analysis to this project. This last site was a bit complicated because for the first few hundred feet, there were no sidewalks, so I had to start making my observations by walking at the Ken Malloy Harbor Regional Park, which is adjacent to Vermont Ave. I only walked 0.8 miles of the southernmost end of Vermont Blvd because there was a lack of pedestrian infrastructure. All in all, approximately 7 miles of Vermont Avenue was covered for the case study portion of this thesis.

CHAPTER 7

WALKING ETHNOGRAPHIC OBSERVATIONS

Overview

This chapter details a few of many patterns that I observed as I walked down Vermont Avenue that speak to the mismanagement and the inconsistencies of tree canopy cover in LA. These patterns are characterized by the different subtitles in this section and the observations are documented by images and captures.

TCC from the 4 Different Sites

As expected, there were varying amounts of TCC along Vermont Ave as I traversed the long avenue. For my first site in the Los Feliz and Griffith Park area, Figure 9 would be the most representative of what I observed. This area is in the northernmost point of Vermont Ave. Figure 9 details a highly shaded part of the residential neighborhood on the foothills leading up to Griffith Park. This is a two-way street with a lush, manicured, and tree-filled center median that splits the street. The sidewalks themselves along this stretch of Vermont were adequately shaded for the most part.

Fig. 9: Image of tree cover in the northern end of Vermont Ave. Taken in a residential area at the foothills of Griffith Park. Image credit: Hoi Cheng Wong

Figure 10 is an image of the busy Vermont Avenue with a bit of congestion and no shade from tree cover at all. In fact, there are very few trees in this image, which was taken at the entrance of Koreatown. A key detail to note in this image is that there is a DASH bus stop to the right of the image. This bus stop has benches for commuters to sit while waiting, but does not offer shade. This becomes a stark recurring theme in the Koreatown stretch of Vermont Blvd. This area has rows and rows of retail shops all along the street and is highly trafficked by commuters in cars, by public transportation, and by foot.

Fig. 10: Image taken at the entrance of Koreatown at the intersection of W Olympic Blvd and S Vermont Ave. Image credit: Hoi Cheng Wong

Vermont Avenue along the western border of the USC campus was very lush (Figure 11). Despite its location in South Los Angeles, USC stands out from its surrounding neighborhoods as being extremely lush, green, and with ample shade. As I was walking down this street, on an 82 degrees Fahrenheit day, I felt protected from the sun and felt a very pleasant, cooling breeze under the trees. This area, of course, is also highly trafficked. There are many drivers but equally as many pedestrians as this is a university campus with a large student population.

Fig. 11: Image taken at the western end of USC campus on Vermont Avenue. Image details ample tree canopy that provided shade for cars, residential areas, and passing pedestrians. Image credit: Hoi Cheng Wong

The last site that I visited along Vermont Avenue is the southernmost end of the street in the San Pedro/Carson/Wilmington area. Figure 12 captures a lot of gray. The gray asphalt, the gray metal fences, the gray buildings. This is an extremely industrial area by the Port of LA, which contributes a lot to the setting of this image. In this image, there are not very many trees that can provide adequate cover. A majority of the greenery and trees were actually at the regional park at the very end of the street. In this image, you can also see that there are no sidewalks and no bike lanes. This portion of Vermont Ave does not only lack tree cover and shade, but it lacks the bare minimum pedestrian infrastructure which are sidewalks.

Fig. 12: Image taken in the industrial Harbor City at the southernmost point of Vermont Avenue.
Image Credit: Hoi Cheng Wong

Neglected Trees

This section will detail trees that I have deemed to be neglected, mismanaged, and uncared for by the city and people who use the roads. One of the first things that I noticed when I strolled down Vermont was the poor and varying conditions that the existing trees were in. Figure 13 is an image of a young tree supported by two sticks. The irony is that these two sticks are thicker than the tree itself, which is evidence for the poor health of the tree. The leaves on this tree are nonexistent and the tree looks frail, malnourished, and beyond any point of growth.

Figure 13: Image of a young (unhealthy) tree being supported by two sticks on a small plot of land by the intersection of San Marino St. and Vermont Ave. Image Credit: Hoi Cheng Wong

Another common scenario that I found is of trees that are dusty, dirty, and diseased. Figure 14 is an image of an overgrown Magnolia tree that is positioned right by the Highway 101 entrance. This tree does not look like a typical Magnolia tree. Instead, it looks like a bush with lots of trash on the ground in the small patch of soil that it is supposed to be growing in (Figure 14). Upon closer analysis, I found that there is a lot of discoloration and dark spots on the leaves, which is evidence of disease or residue left behind by particulate matter (Figure 15). Additionally, Magnolias shed all year round, which would require routine maintenance, which is clearly not the case in Figure 14 nor 15.

Figure 14: Image of an overgrown Magnolia tree positioned near Highway 101 entrance by the intersection of Clinton Street and Vermont Ave. Image Credit: Hoi Cheng Wong

Figure 15: Close up image of the discolored and diseased leaves on the Magnolia tree from Figure 14. Image Credit: Hoi Cheng Wong

Figure 16 displays bright green new growth from a tree in Koreatown, which is usually a good sign. However, upon further examination, these are the only leaves that are bright green. The other leaves, albeit older, are extremely dark in color and very dusty. Granted, this tree is positioned right next to a busy section of Vermont with lots of vehicles moving in both directions. However, this image reveals the truly unhealthy and stark conditions that the trees are subjected to in a large and bustling city such as LA.

Fig. 16: Image of brightly colored green new growth on a young tree in Koreatown by the intersection of W 5th St. and Vermont Ave. Image Credit: Hoi Cheng Wong

Defiant Trees

From just one day of observations, I was able to achieve a greater understanding of the struggle for humans to coexist with nature in the LA urban landscape. Not only do trees not have enough space nor resources to thrive in the city as they are surrounded by constant development and the resulting concrete jungles (Figure 17), but the trees that do exist in the city are consistently treated as objects that are subjected to human control or lack of care and interest. Figure 18 is an image of a tree that is contorted and missing half of its canopy due to its proximity to a multi-story building that is stunting its growth. It is difficult to tell if the tree has been cut and manipulated by humans to not touch the building or if it has just adapted to its surroundings naturally. However, this image is indicative of the strength and the resiliency that these trees do have to adapt to unnatural human-made forces such as urban development.

Fig. 17: Image of a leaning tree that is almost fully grown. The stick that was originally used to support it in its youth is now being pulled to the side by the size and the strength of the growing tree. The background of the picture is a development site near the intersection of Beverly Blvd and Vermont Ave. Image credit: Hoi Cheng Wong

Fig. 18: Image of a large tree missing half of its canopy as it grows right up against a multi-story establishment in the Los Feliz area by the intersection of Melbourne Ave. and N Vermont Ave. Image credit: Hoi Cheng Wong

Another major observation is the abundance of cracked sidewalks and uneven pavement that is on Vermont Avenue. Many of the cracked sidewalks are due to tree growth. Figure 19 details this tension between humans and nature clearly. The roots of this large tree have broken the concrete on the sidewalk multiple times. The city has tried to cover and smooth out the cracks with new layers of tar and asphalt. However, the tree has broken through and lifted the new layer yet again. As a result, the sidewalk is now unsafe for pedestrians and especially inaccessible to those who have a mobility impairment such as wheelchair users (Nelyveld, 2019). Due to all this pavement, this tree is now also lacking water as there is little to no room for water to infiltrate into the tree's root system.

Fig. 19: Image of cracked and repaved sidewalk that has been lifted by the strong roots of a large tree between W 5th St and W 6th Street on Vermont Ave.
Image Credit: Hoi Cheng Wong

Absent Trees

A common image that was spotted all along Vermont Avenue was images that looked like Figure 20. It was guaranteed that there would be at least one tree stump for every few blocks that I passed. This is evidence that the city is actively removing trees. However, by solely analyzing the tree stumps, I could not tell what the reasons were for the tree removal. Upon looking at the tree stump in Figure 20, one could hypothesize that the tree was probably removed due to malnourishment and poor health. The tree stump is encased and surrounded by concrete, which might have been the cause of the death of the tree.

Fig. 29: Image of tree stump surrounded by concrete by the intersection of W 1st St. and Vermont Ave. Image Credit: Hoi Cheng Wong

This next image is of tree branches in a pile on the side of the sidewalk, and looks as if these branches have been recently pruned off of an older and larger tree (Figure 21). This image is a bit ominous, because when I looked around the block, I was unsure where these branches had come from. These branches beg the questions of: Who removed these branches? Why were these branches removed? Where will these branches be going? And how often do trees get pruned? This pile of branches is the only sign of tree maintenance, albeit ambiguously, in all of my observations.

Fig. 21: A pile of branches pruned off of a tree sitting on the side of a sidewalk at the intersection of W 7th St. and S Vermont Ave. Image Credit: Hoi Cheng Wong

Successful Trees

Despite many cases of trees in poor habitats and poor growing conditions, there were a few notable examples of what I would call "successful" trees that resulted in effective tree cover. Figure 22 is a beautiful example of what successful and intentional tree planting could look like. There is ample shade underneath the trees that is created by the tall trees on both sides of the sidewalk for pedestrians (Figure 22). When I walked under that canopy, the effects were felt immediately. The temperature was degrees cooler than if I were to take a few steps out of the canopy. These trees look well-managed and relatively healthy.

Fig. 22: Image of successful and effective tree canopy that is providing shade from both sides of the sidewalk by the intersection of Lockwood Ave and N Vermont Ave. Image Credit: Hoi Cheng Wong

Other examples of successful tree planting and placement are detailed below. It is important for the benefit of the trees to not only be enjoyed by pedestrians, but also other civilians such as street vendors (Figure 23). I walked past this area near Hollywood Blvd on two separate days of observations. This same street vendor was there on both days in the same spot, under the shade that is provided by these large trees. Both days were extremely hot days with highs of 82 and 91 degrees Fahrenheit respectively.

Fig. 23: Image of street vendor stationed under the shade provided by large tree canopies at the intersection of Hollywood Blvd and Vermont Ave. Image Credit: Hoi Cheng Wong

In a busy and vehicle-dependent city such as Los Angeles, the shade that is provided by an effective tree canopy can also be enjoyed by commuters who must drive and find parking on a regular basis. Figure 24 details a row of cars that are parallel parked under a row of trees by the sidewalk, entirely protected from the sun. Residents and commuters who depend on the public transportation system in the city also benefit greatly from effective tree canopies as they wait for their buses to arrive (Figure 25). Additionally, the buses and bus drivers themselves can also rest under the shade as depicted in Figure 26.

Fig. 24: Image of cars parked under trees and fully shaded from the sun in Los Feliz. Image Credits: Hoi Cheng Wong

Fig. 25: Image of large tree canopy shading a bus stop with a commuter waiting for the bus by Hollywood Blvd.
Image Credit: Hoi Cheng Wong

Fig. 26: Image of buses idling under the shade by Hollywood Blvd.
Image Credit: Hoi Cheng Wong

Conclusions

These unique images captured the varied conditions in which the trees of LA are subjected to. There were long stretches of Vermont Avenue with no trees and no adequate tree cover in sight. This was the case in Koreatown and the San Pedro stretches of Vermont Avenue. Many images that I took were of tree stumps or trees that were either overpruned or not pruned at all. These images are visual manifestations of the data that we see from the maps in Chapter 5. All of these are signs of mismanagement and the inconsistent maintenance of trees just along one avenue in LA.

CHAPTER 8

CLOSING REMARKS

Main Takeaways

From these findings and observations, we can begin to understand the varied roles that trees play in our day to day lives. My experiences walking through the streets and observing the different trees at various stages of growth and conditions revealed a lot about the lack of oversight and responsibility in the city government in terms of infrastructural maintenance. This project has highlighted the significant influence that tree canopy has on residents' quality of life in LA, as trees play a large role in controlling and moderating our natural surroundings. This project also revealed the multi-scalar nature of urban infrastructure issues such as the lack of tree canopy. The problems of unequal distribution of tree canopy and inadequate pedestrian infrastructure are matters that should be of concern to constituencies on many levels, from the government officials that have the power to enforce, maintain, and implement appropriate tree cover management protocols to the everyday pedestrians who traverse the streets of LA and experience the direct but often unseen benefits of trees. The unequal distribution of tree canopy cover is also multi-scalar in the sense of policy implementation and application. My work on this project has been very local to particular neighborhoods in LA. However, this work also has a very global reach and could be picked up and dropped off to analyze different cities across the world or just a different street in LA. From walking down Vermont, I also became a witness to the lack of consistent management of and the lack of progress on tree canopy cover. This was all felt and experienced physically on two separate very hot days. The lack of progress in the increase of tree canopy cover in LA is indicative of how the city government does not prioritize TCC as a critical component to the quality of pedestrian infrastructure and urban streetscapes. Furthermore, the city's failure to meet their tree canopy goals is a reflection of their failure to prioritize LA residents and pedestrians' public health and safety.

Looking Towards the Future

The ominous and haunting images of existing trees that are struggling to survive on Vermont Avenue points to the lack of consistency and regard that the city has for its pedestrian infrastructure, natural environment, and the public health and safety of its residents. The city is recognizing this issue–a threat to the resilience of LA's urban ecosystem, and is now beginning to prioritize the increase of tree canopy as stated in Mayor Garcetti's Green New Deal. However, it is not enough to just plant trees in the city. Trees planting initiatives are not projects that can be visualized and applied overnight. Trees take time to grow and mature, which demands long-term commitment and consistency from the government to prioritize caring for trees that currently exist in the city. In 2019, Mayor Garcetti elected Rachel Malarich as the City Forest Officer within the Board of Public Works to oversee the long term and short term goals of the Green New Deal with an equitable approach (Department of Public Works). This is a monumental step for the City of Los Angeles, as there is now a designated person for this task force, indicating renewed interest and commitment towards tree canopy projects.

However, there is much work to be done not only simply in regards to increasing tree canopy cover. As indicated in my research, many spaces that are in need of increased tree canopy and a reinvestment in the urban pedestrian infrastructure Los Angeles is concentrated in South LA, which is a historically marginalized community. According to a study done by The University of Utah and UCLA Institute of the Environment and Sustainability, "[w]hen large parks are built in historically marginalized urban areas, they can contribute to 'green gentrification,' a process involving increases in housing prices and the influx of new, wealthier and often white residents in low-income communities of color" (Rigolon and Christensen, 2019). This tree canopy cover project must not further contribute to green gentrification, which already

exists in many parts of Los Angeles. Further suggestions and critique on this topic is beyond the scope of my research, but it is important to note the existing tensions that LA has with gentrification as we progress with LA's urban infrastructure.

Another looming item that is on Los Angeles' agenda is that the city committed to hosting the 2028 Summer Olympics, which is projected to cost $7 billion (Wharton and Smith, 2021). The city has already planned to make many infrastructural changes within the city including "critical transit projects" that already requires the allocation of $1 billion in state funds to facilitate and support the large influx of people from across the world (Zahniser and Nelson, 2021). This begs the question of whether or not LA's infrastructure would be able to support such a large-scale monumental event, given the current infrastructure that is clearly lacking and demanding to prioritize LA residents. The priority that LA has put on the 2028 Olympics also raises the question of what "infrastructural improvements" or "beautification" efforts they would partake in. In preparation for the 1932 Olympics that LA also hosted, the city planted 250,000 palm trees, fueling LA's "desert oasis" image, deeming this effort as a "beautification project" (Masters, 2011) and resulting in damage to LA's natural and native landscape. Further discussion of this topic will require additional research. Given these two projections into the future, every urban planning decision and any infrastructure projects in the next few years will be very telling of the intentions and priorities of the city government. As of today, there is a heightened and urgent need for the City of Los Angeles to protect and prioritize the health and wellbeing of its residents and everyday commuters, which is revealed by the inconsistent and unequal distribution of tree cover canopy across the city.

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