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Warehouses in the Inland Empire: Displacing Land and Life

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Terms and Definitions

Assessor's Parcel number (APN): A unique identifier assigned to each parcel in a land jurisdiction in the US. Also called Assessor's identification number (AIN or Property identification number (PIN).

Built environment: The total environment that one interacts with when living in an urbanized setting, arising out of the interweaving of human infrastructure with the existing landscape.

Company town: Phenomenon of a town's local economy becoming reliant on a single company via employment, access to critical resources such as education, food, or transport, and/or the spatial arrangement of the town.

Ecosystem services: The benefits that are afforded to human societies by natural features of the environment. Examples include groundwater storage, hunting and fishing, and pollution mitigation.

Externality: A positive or negative aspect of an economic activity that impacts someone other than the producer of the economic activity.

Geographic Information System (GIS): A class of software which allows for the viewing, creation, modification, and analysis of spatial, coordinate-driven datasets.

Inland Empire: A loosely-connected region generally conceived of as consisting of Riverside and San Bernardino Counties.

Land use code: A code which the County Assessor assigns to describe the current usage of a land parcel. Compare with "Zoning code".

Latine: A gender-expansive alternative to "Latina/o" and pronounceable alternative to the academic term "Latinx". Refers to people who have ethnic origins in Mexico, Central, or South America.

Logistics industry: The business of expanding and expediting the transportation of goods, particularly with the use of trucks, trains, and cargo ships.

Neoliberalism: Economic and political ideology that moves to lower barries to global trade, increase private intervention in the public sector, and maximize the role of individual free choice.

Settler-colonialism: A nation-building framework that seeks to dispossess Indigenous people from a land with the explicit intent of installing a permanent settler state.

Shapefile: A file containing spatial data readable by Geographic Information Systems (GIS) software.

Warehouse: A large-scale storage and/or packing facility with a constant flow of goods, mediated by truck loading and unloading dock centers that are attached to the facility. This does not include smaller retail centers and sub-one-acre storage facilities.

Zoning code: A code which the County Assessor assigns to describe the potential and/or allowed usages of a land parcel. Compare with "Land use code".

Chapter 1

Introduction

On the eastern outskirts of the Los Angeles metropolitan area lies a lesser-known region called the Inland Empire (used interchangeably with "IE"). Comprising Riverside and San Bernardino Counties, two of the largest counties in the United States,[1] the IE is a vast, loosely connected community that has undergone dramatic changes in demographics and land use in a relatively short amount of time. Before it was known as the Inland Empire, the land was home to unique groups of Indigenous peoples, including the Tongva (Gabrieleño), Kitanemuk, Mojave, Acjachemen, Maara'yam (Serrano), Payómkawichum (Luiseño), and ?ívilũwenetem Meytémak (Cahuilla). Beginning roughly two hundred and fifty years ago, the attempts of the Spanish, and later the United States to enslave, assimilate, or otherwise extirpate Indigenous communities from the land initiated an unprecedented upheaval of land and life, in which Indigenous people became an exploited labor class in service of capital accumulation for the Spanish missions, Mexican *ranchos*, and the growing city of Los Angeles.

With the large-scale migration of thousands of European settlers to Southern California throughout the late nineteenth and early twentieth centuries, the Inland Empire region became predominantly white by World War II (De Lara, 2018). However,

[1] At over 20,000 square miles, San Bernardino County is the largest county in the United States by area (United States Census Bureau, 2021)

deindustrialization and subsequent white flight transformed the IE yet again. Towns that had once provided opportunity in the manufacturing sector for unionized white blue-collar workers to achieve their middle-class dreams in the twentieth century are now predominantly urbanized Latine cities in the twenty-first. Cheap land relative to that of Los Angeles has attracted those looking for more affordable housing, which has in turn driven sprawling real estate development to elevate the IE into one of the country's largest real estate markets, even after the Great Recession of 2007 to 2009 plunged the region's inhabitants disproportionately into financial crisis from which they have still not recovered (Bonacich and De Lara, 2009; De Lara, 2018).

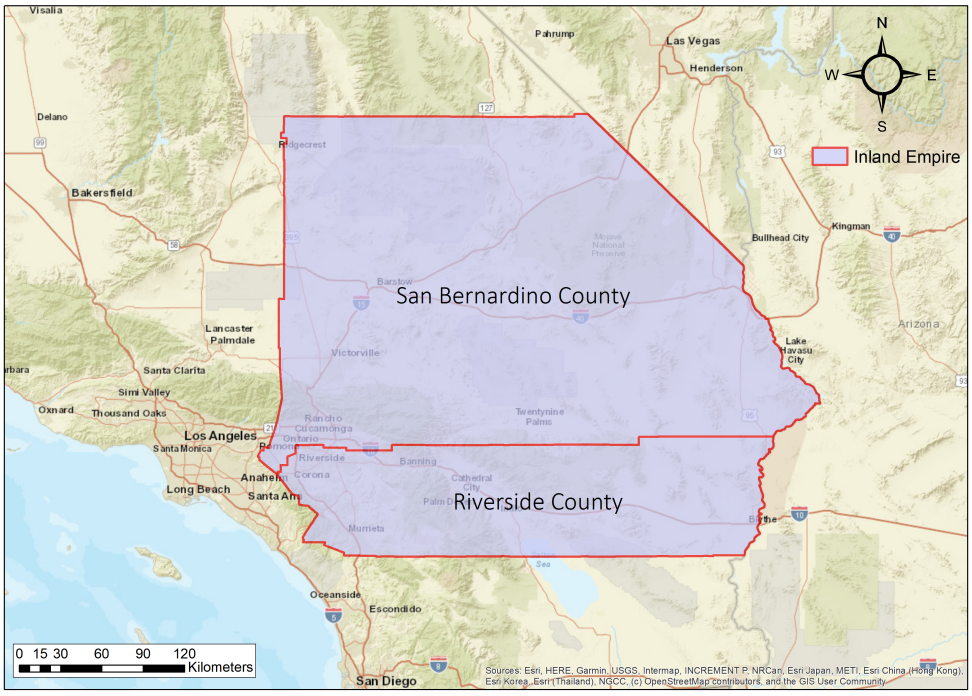


Figure 1.1: San Bernardino and Riverside Counties comprise the geographical region known as California's Inland Empire.

The Inland Empire is also considered a highly attractive region for another sector: the warehousing and logistics industry (abbreviated to "logistics industry"). The logistics industry coordinates the shipping and distribution of physical goods–via truck, plane, and/or train–from manufacturer origins all the way to the doorsteps of consumers, all the

while competing on the margin to make shipments faster, more efficient, and more profitable for their partner firms. Logistics companies are drawn to the IE for its cheap and large availability of land, as well as the major highways, interstates, and train routes that run alongside, and often through, densely suburban cities (Figure 3.1). This infrastructure allow for the construction of affordable storage and distribution facilities and for shipments to travel more efficiently to their final destinations–but also crucial to the picture is the relatively new supply of blue-collar, predominantly Latine labor that has proven invaluable to mega retail companies such as Amazon and Walmart who require low-wage employees to manage ever-growing warehouse inventories. A case in point: Amazon has recently become the largest private employer in the IE, with over one in five of the region's 200,000 warehouse workers working at Amazon as of 2022 (Asher, 2022; Singh, 2022; Yee, 2022).

Lawmakers, city council members, and county supervisors in the IE have generally welcomed logistics-oriented development as an effective path towards economic recovery and growth. Because many IE cities were hit especially hard in the 2008 Great Recession (Bonacich and De Lara, 2009), local municipal governments tend to see warehouse projects as a financial boon that will restore sagging tax bases and supply much-needed job opportunities to the region. However, residents of the Inland Empire don't always see eye-to-eye with local legislators. Community activist groups have argued for years that warehouse siting is an environmental justice issue, pointing out that while warehouses themselves are not inherently polluting, the diesel trucks that constantly enter and leave warehouse facilities are a major source of air and noise pollution (Center for Community Action and Environmental Justice, 2022; The People's Collective for Environmental Justice, 2022). Research driven by community organizers has found that in the Inland Empire, the closer a neighborhood is to a large warehouse, the higher the proportion of low-income, Black and Latine people living in that neighborhood (Stroik and Finseth, 2021; Torres et al., 2021). Consequently, poor Black and Latine households disproportionately experience the effects of inhaling diesel fumes from trucks that circulate

in and out of warehouses. Diesel fume inhalation exposes the body to ultrafine particulate matter, nitrogen oxides, and ground-level ozone, potent pollutants which are associated with higher rates of asthma, cancer, heart attacks, and premature death, among other health effects (Perez et al., 2009; Lelieveld et al., 2015; Stroik and Finseth, 2021). Neighborhoods are often not informed of warehousing projects until construction has already begun, sometime less than 100 feet from homes and schools (Esquivel, 2019; Singh, 2022; Waddell and Singh, 2021).

At the same time as nationwide consumers have benefited from, and indeed, come to expect, ever-expanding larger online store inventories and ever-faster shipping times, the land and people of the Inland Empire are left to deal with both the economic and environmental complexities of the warehousing boom (De Lara, 2018; Jaller and Pahwa, 2020). While municipal air quality monitoring entities recommend that warehouses be built a minimum of 1000 feet from residences to reduce the majority of pollution exposure, such entities lack the ability to regulate mobile pollutant sources (California Environmental Protection Agency", 2005). Because warehouses are merely the sites at mobile pollutant sources (i.e., diesel trucks) congregate, companies have largely able to avoid legislative scrutiny. Despite the apparent nationwide success of the Clean Air Act, racialized communities in the IE now suffer from some of the worst air quality in the nation due to diesel truck emissions, which are concentrated at the loading docks and highways connected to shipping and fulfillment warehouses (American Lung Association, 2022).

Even though environmental justice groups have been organizing against warehouse projects in the Inland Empire since the 1990s–nearly as long as the warehousing and logistics industry has been building warehouses–warehouse construction shows no sign of stopping. In fact, the proliferation of warehouses in the Inland Empire in the twenty-first century, and particularly in the last decade, has been staggering. As of 2022, the world's largest Amazon warehouse is being constructed in Ontario, California, a city in which over 600

warehouses already occupy 16% of all land (Singh, 2022; Phillips and McCarthy, 2022). Frequently, developers often buy out entire neighborhoods in order to raze the land and build warehouses on former residential or agricultural properties, with those who refuse to sell left to deal with the consequences (Esquivel, 2019).

This mode of land development is the most recent strategy of powerful capital interests who continue to profit off of land and people in a region that has continually been situated as a frontier region for Los Angeles. In Chapter 2, I evaluate how the colonization of the Inland Empire's Indigenous people and land, first by Spanish missionaries, then Mexican ranchers, and finally, American settlers set the stage for a series of dispossession of land, people, and labor by capital interests in the coming centuries. Indigenous erasure allowed the land to be seen as pliable space for forms of resource extraction ranging from dairy farms and citrus fields, military manufacturing, to warehouses. Stark shifts in the demographics of people who moved in and out of the IE was closely correlated with each change in dominant local industry. Despite urbanites' perceptions of the IE as a mostly lifeless desert, the Inland Empire embodies unique spatial and social configurations as a consequence of how settler-colonialism has manifested locally in the region. In Chapter 3, I present a summary of research that demonstrates the health burdens that especially Black and Latine IE households must face as a result of the targeted siting of warehouses in communities of color. I argue that most research on the effects of warehouses has focused on proximity effects, without considering the spatial aspects of land use displacement. I pose questions about the magnitude and spatial aspects of displacement resulting from warehouse expansion in the Inland Empire, which I address in Chapter 4. Chapter 5 addresses potential mechanisms for observed trends in the IE's land use changes and speculates about possible futures for the region. These futures range from the green capitalist landscape that current and prospective climate policies anticipate, to liberatory futures that prioritize the return of Indigenous land and the right of all IE residents to be healthy and housing-secure.

Chapter 2

History of the Inland Empire

> The relationship between racial capitalism and logistics can be traced back to the fifteenth century, when the encounter between European merchant capitalism and the Americas generated new Latinx American identities that were rooted in the confrontation between indigenous ways of life and the imperial project of coloniality that ensnared Black and indigenous bodies into the global circuits of profit accumulation and slavery
> –Juan De Lara, *Inland Shift*, 2018

2.1 Upending Indigenous Land and Life

Even before warehouses and suburban sprawl took hold, the land now known as the Inland Empire has long been a place in which the struggle for the right to control land and life rages. For thousands of years, hundreds of thousands of Indigenous peoples hailing from dozens of tribes, including the Tongva (Gabrieleño), Kitanemuk, Mojave, Acjachemen, Maara'yam (Serrano), Payómkawichum (Luiseño), and ?ívilũwenetem Meytémak (Cahuilla), lived within the diverse inland landscape, from over the mountains, across the valleys on either side of the Santa Ana River, around the chaparral foothills, and in the

scrubby deserts (Temprano, 2021). Where I am writing from in Claremont, California, was once a large Tongva village called Torojoatnga.

Over many generations, local Indigenous people cultivated deep relationships with the land. Living in autonomous villages, they actively maintained the landscape using methods such as controlled burning, which ensured that chaparral stands would not get too dense for purposes of hunting game or gathering plants (Blackburn and Anderson, 1993; Patterson, 2016). So important are Indigenous relationships to the land around them that contemporary Indigenous Studies scholars have asserted that the land is constitutive of Indigenous understandings of self (Hart, 2010). As Charles Sepulveda (Tongva and Anjachamen), puts it, "Indigenous peoples' beings are inseparably attached to the earth and are affected by the health of their land and water" (Sepulveda, 2018). For Indigenous people, land is life and life is land, a way of being that is reflected and sustained through traditional practices which prioritize the respect for and longevity of life-giving plants, animals, and other non-human entities (Kimmerer, 2013).

European colonizers disrupted these relationships primarily by engaging in methodical acts of invasion and genocide in attempt to erase Indigenous people from the land. It should be noted that the continued encroachment onto Indigenous land and destruction of Indigenous life, rather than solely resource extraction, is the primary objective of settler-colonialism (Hernández, 2017; Whyte, 2018; Wolfe, 1999). However, I argue that especially in North America, Indigenous land is maintained as settled through its conversion into a resource that provides ideological and material sustenance for the continuation of the colonial project. I interpret three ways in which colonization in Southern California has enacted a spatial upheaval of land and life for Indigenous people in particular, and people of color–specifically, those existing outside of the racial order allowed by the settler state–in general. Under settler-colonialism, land becomes a space for:

1. The maximization of the short-term extraction of natural resources, with little to no

regard for social or ecological welfare.

2. The cultivation of an expendable, racialized labor pool that is maintained in physical proximity to the colonial center, but kept economically destitute with little social mobility in order to aid in the flourishing of the colonial order

3. The formation of a pliable "testing ground" for new forms of technology in pursuit of scientific progress, in the process entrenching the status of local peoples as expendable and further erasing local Indigenous presence (Bahng, 2020; DeLoughrey, 2013)

Encroachment on Indigenous land is enabled through racialized economic regimes, namely imperialism and capitalism, which provide the capital required for continued Indigenous land theft and the subjugation of Indigenous and racialized peoples, who are in the process converted into impoverished classes of exploitable labor. Settler colonialism and racial capitalism thus work in tandem to form plantation economies.[1] Plantation economies arise from dominant industries that maintain the exploitative spatial and social configurations of land and labor.

2.1.1 The Beginnings of Settler-Colonialism in Southern California

The first plantation economy in the IE was formed around Mission San Gabriel Arcángel. While Mission San Gabriel was physically located on the outskirts of what is usually deemed the Inland Empire, the reach of Spanish missionaries extended well into the IE's current boundaries. The Tongva first encountered Spanish missionaries in 1769.[2] It was

[1] My conception of the plantation draws from McKittrick to extend beyond the place where chattel slavery operates. The plantation is constitutive of the geographical configurations that thrive off of Black death and the destruction of Indigenous people and land (McKittrick, 2013).

[2] While all Indigenous peoples of present-day inland California suffered from various forms of violence and labor exploitation as a result of colonization, Tongva histories appear to be more common–or at least more heavily cited–within critical Indigenous studies literature as opposed to the histories of the Kitanemuk, Mojave, Acjachemen, Maara'yam (Serrano), Payómkawichum (Luiseño), or ?ívilũwenetem Meytémak (Cahuilla), among others, despite overlapping histories in the Mission Period. I conjecture that this gap may result in part from the urban bias of academia and by extension, American settler society–the

this year that the Portolá Expedition documented their travels and marveled at how suitable the land appeared for agriculture, their explicit objective being the expansion of the Spanish Empire (Sepulveda, 2018). By 1771, missionaries, accompanied by militarized factions of Spanish soldiers, had enslaved Tongva people as well as significant numbers of Maara'yam (Serrano) people, who lived farther inland, and forced them to build Mission San Gabriel (San Manuel Band of Mission Indians, 2022; Haas, 1995). Other inland Indigenous peoples, such as the ?ívilũwenetem Meytémak (Cahuilla), lived in the deserts in what is now the Coachella Valley and were generally able to avoid being captured for mission labor, since the Spanish did not prioritize exercising colonial control over desert regions (Gentilcore, 1960).

The mission system facilitated the first iteration of Native land dispossession in the area. Tongva and Serrano villages were regularly destroyed and their inhabitants forced to move to the Mission and related establishments, where they were enslaved for agricultural and other labor (San Manuel Band of Mission Indians, 2022). Tasks on the mission grounds were strictly separated by gender and age, introducing a practice of gendered labor exploitation that would continue into the present day under modern global capitalism. The Spanish mission system embodied the first wave of European colonization that sought to domesticize and incorporate Indigenous land and people into the dual logics of imperial domination and racial capital accumulation (Sepulveda, 2018).

Mission San Gabriel systemically converted Indigenous land to farmland for livestock and crops, and did so extremely successfully: primary sources state that the mission was so productive that missions elsewhere in the larger area were relying on its food shipments (Gentilcore, 1960). This productivity was only achieved through using the reach of the mission to optimize the labor of Native peoples via dispossession from their homelands. The missions were not created simply to convert all Native peoples to Christianity, as some

whole of Los Angeles sits upon Tongva land, while the latter tribe's land sits further east and inland. It is through such means that rural erasure compounds Indigenous erasure.

popular depictions of the missions might suggest; rather, it was the explicit aim to profit off of land and people that drove the Spanish to impose European agriculture and murder, enslave, and separate Indigenous people from their land.

Tongva, Serrano, Cahuilla, and other local Indigenous people remained a racialized exploited labor class after the end of the Mission Period in 1833, when many Indigenous people remained enslaved by Mexican and Spanish families for work on *ranchos* built on former mission land.[3] By this time, Indigenous people were decimated by disease, starvation, and enslaved labor; surviving communities were largely displaced from their home villages. Following California's initiation into the United States in 1848, "life for many Tongva continued under a system of regulated slave labor... despite the state entering the Union as free" (Sepulveda, 2018). In the town of Riverside, many Cahuilla moved into seasonal villages near ranches and farms to work as laborers for white settlers in the late nineteenth century (Gudis, 2022). However, the documented resistance of local Indigenous people over multiple centuries, such as the uprising led by a Tongva woman Toypurina at Mission San Gabriel in 1785 (Hackel, 2003), and persistence as a people today demonstrates the inability of settler-colonialism to complete its primary objective.

Mission San Gabriel's systematic displacement and labor exploitation of Tongva, Serrano, Cahuilla, and other local Indigenous peoples was part of a logic of racialized capital accumulation and land dispossession that persisted even after California was absorbed into the United States in 1848 following the Mexican-American War. The Spanish Mission Period and subsequent Mexican *ranchos* and American settlements initialized the violent transformation of Inland California's land and life, as well as prepared the region for its persisting treatment as a "testing ground" for new forms of labor subjugation.

[3]Indigeneity is a real and often complex component of cultural and racial identity for many present-day Mexicans. However, in this local and historical context, Mexico was a colonizing force in the area, as Mexican settlers continued the Spanish mission system of Indigenous labor exploitation by hiring Indigenous people on Mexican *ranchos* during Mexico's control over California from 1833-1848.

2.2 The Inland Empire, Nineteenth Century to Present

This section highlights just a few of the most important developments in the time period after California was transferred to United States control through the late twentieth century. Gold was discovered soon after the 1848 treaty conditions of the Mexican-American War forced Mexico to turn over much of what is now the Southwest to the control of the United States government, encouraging large numbers of white American and European settlers to start migrating west (VandeCreek, 2016). By the end of the nineteenth century, citrus exports made up the majority of Riverside and southern San Bernardino County's exports, with increasingly industrialized citrus operations relying primarily on migrant labor. The citrus industry made white property owners rich, especially in Riverside, California (Moses, 1995). Agents working for the Bureau of Indian Affairs sent Indigenous children to the Sherman Institute in Riverside as part of the United States' boarding school program in the early twentieth century, where they were forced to labor on citrus farms (Whalen, 2016). Significant numbers of Dutch, Portuguese, and Basque settlers immigrated to the Los Angeles area in the 1920s and purchased land for dairy farming, leading the region to become the first in the country to industrialize dairy in the 1930s (Singh, 2022). Until the mid-twentieth century, Los Angeles County was the nation's top producer of dairy, with many farms also located in the southern and western parts of the Inland Empire in areas such as Chino and Ontario (De Martino et al., 2011; Gentilcore, 1960; Gilbert and Wehr, 2003).

Historians note the business, rather than farming-oriented behavior of Californian agricultural companies such as the George F. Johnston grape company in Etiwanda (now integrated into the city of Rancho Cucamonga) (Holmes, 2013). This wave of migration reified the conversion of Indigenous land primarily for the economic benefit of white settlers, especially large agricultural shareholders. As was the case in California's early

colonial period, Indigenous land was primarily exploited for its agricultural utility in this era, but the exploited labor pool expanded from Indigenous labor to include Mexican as well as Chinese, Japanese, Filipino, and Indian labor, in addition to white laborers who had migrated west in search of work (Mitchell, 1996).

During World War II, increased need for manufacturing for the military and related sectors and the recent construction of the Kaiser steel mill made way for a second wave of diverse migration of working-class status people seeking to settle down and buy homes in the region White manufacturing workers were given the best jobs and received the majority of union benefits, while Black, Latine, and Asian workers were thrown to the economic and political margins (Bonacich and De Lara, 2009; De Lara, 2018). The manufacturing industry and older agricultural industries formed the economic backbone of the IE at the time and governed how land was developed.

2.3 A Twenty-First Century Inland Empire

In the latter half of the twentieth-century, the Inland Empire grew extremely quickly, adding almost a million residents within a decade (De Lara, 2018). Consequently, the region became increasingly urbanized, while farmland began to decrease rapidly, a trend that is consistent with urbanizing areas around the world (Chen et al., 2010). Other land uses, such as commercial, residential, and industrial developments began to replace agricultural properties (De Lara, 2018).

Throughout the 1990s and early 2000s, Black, Latine, and Asian families comprised most of the people moving into the region (Mordechay, 2020). The in-migration of people of color and simultaneous exodus of white people made the region predominantly Latine by the turn of the twenty-first century (Bonacich and De Lara, 2009). Vast tracts of cheap, "empty" land enticed real-estate developers to build houses en-masse and market them as affordable alternatives to the crowded domains of the Los Angeles metropolitan area.

Disillusioned by high home prices in Los Angeles and seeking safe suburban communities to raise their children, newcomers to the IE saw the region as a place in which they might be able to attain the quintessential American dream of homeownership.

However, banking entities profited from awarding high-risk housing loans to these families (De Lara, 2018; Mordechay, 2020). When the Great Recession hit in 2008, many of these families lost everything. Unemployment and poverty skyrocketed and high-school graduation fell–and have failed to recover–at rates more extreme compared to the rest of California and the country (Bonacich and De Lara, 2009; Mordechay, 2020). Investors frequently purchased foreclosed homes and then "[rented them] out to the same families that once owned them" (Mordechay, 2020). Powerful business interests have thus ensured that entire communities are unable to recover from the inevitable capitalist crisis that was the Great Recession (Pulido, 2016).

Thus, the desire for homeownership by families of color correlated with the rise of the IE's logistics industry to create highly racialized spatial patterns of labor, migration, and financial predation in the late twentieth and early twenty-first centuries. These dynamics constitute a geographic unevenness which has resulted in poor communities of color in the Inland Empire have become the intentional targets of an updated neoliberal economic regime that deems these communities expendable, both in terms of housed-ness and labor. This has in turn paved the way for national and transnational retail companies to rapidly take hold of the region without subsuming the real-estate industry in the years post-Recession. In Chapter 3, I examine how neoliberal economic restructuring allowed the IE's logistics industry to continue the settler-colonial project through land dispossession and labor exploitation of racialized communities of color, three centuries after the Spanish Mission Period first devastated land and life for Indigenous peoples in the IE.

Chapter 3

Warehouses in the Inland Empire

> Human suffering and social inequality also are sites where... pain is intimately linked to the harm visited upon fragile ecosystems and other animals.
>
> –David Pellow, *What is Critical Environmental Justice?*, 2017

3.1 Why Build Warehouses in the IE?

Warehouses started being built in the Inland Empire in the late 1990s and early 2000s. This occurred firstly as a response to neoliberal global restructuring beginning in the 1980s (Kotz, 2002), which placed unprecedented power into the hands of transnational corporations and pushed more imports Southern California logistics than ever before (De Lara, 2018).[1] Observing potentials for further growth, local port and transportation authorities excitedly lobbied for public funding to solidify Southern California as home to a "world-class goods movement industry" (Business, Transportation and Housing Agency and California Environmental Protection Agency, 2007). Concerns were already present

[1] Now, around 40% of all imports to the United States enter the country through the Los Angeles or Long Beach ports (Karlamangla, 2021)

about the environmental health impacts of Southern California's logistics infrastructure, though attention focused mainly on the ports of Los Angeles and Long Beach. In a scenario that has become all too familiar, those who live closest to the ports and port-adjacent freeways, and thus experience the most exposure to truck and other forms of industrial pollution, are disproportionately low-income Black and brown communities (Houston et al., 2008). Regulatory bodies were aware of this issue by the early 2000s, and subsequently began making recommendations to mitigate environmental pollution in port areas while maintaining support for the large-scale expansion of the regional goods movement industry (Business, Transportation and Housing Agency and California Environmental Protection Agency, 2007). At the same time, port and logistics lobbyists responded to environmental health concerns by using the threat of capital abandonment. They argued that if logistics infrastructure development wasn't allowed to occur freely, then firms might leave and invest in other port regions outside of California for goods transport (De Lara, 2018).

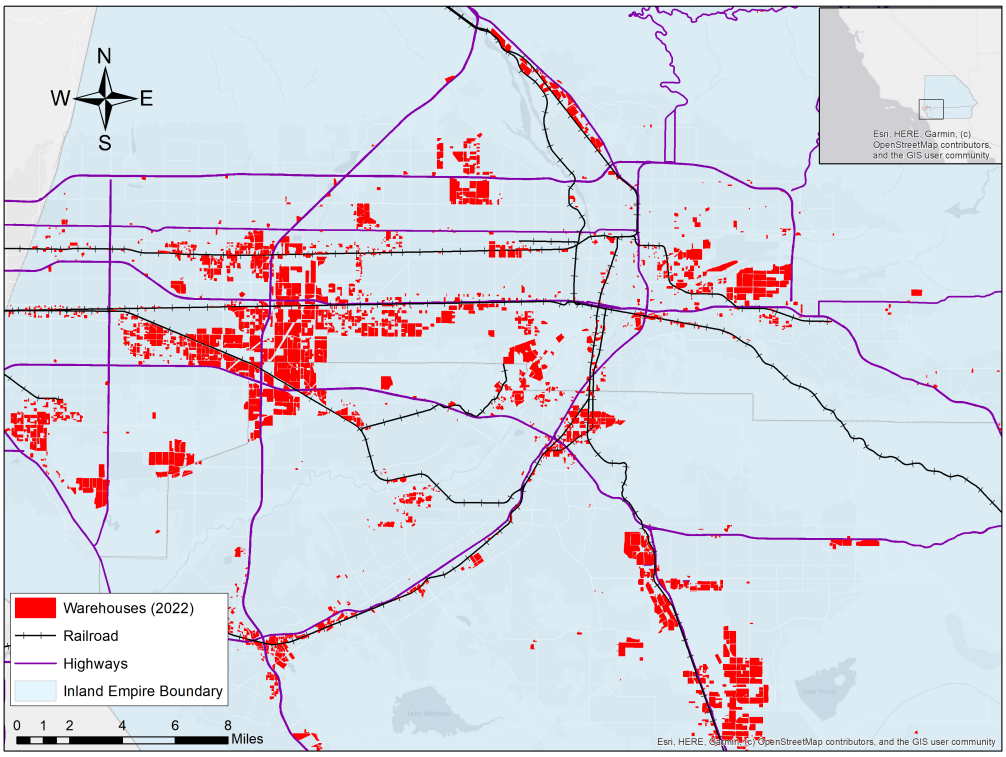


Figure 3.1: Warehouse distribution in the southwest Inland Empire with respect to transportation infrastructure such as highways and rail lines.

In response to these pressures, Inland Southern California was pinpointed as an ideal region in which to improve transportation infrastructure during this time for the logistics industry. Not only did it have an existing rail and highway network, but also land was cheaper than Los Angeles and not anywhere near as developed 3.1. It is for these reasons that De Lara describes the IE as a "spatial fix" for Southern California's logistics industry, designed to solve the problem of increased goods transport and the need to mitigate visible environmental harms (De Lara, 2018):

> Volume created a spatial problem. Where did they intend to put all the stuff that was being imported, and how were they going to minimize environmental health damage in a densely populated urban area?

The Inland Empire was also considered feasible for development because even though environmental justice activists and some academics had successfully raised awareness about the environmental and public health harms of port expansion in South Central Los Angeles and Long Beach, Inland Empire residents had not felt the acute effects of industrial development on their communities. Consequently, city and county political leaders in the IE were able to welcome the logistics industry into the region without widespread backlash from residents.

With the help of local government, logistics firms began integrating warehouses into the urban fabric of the IE. By 2004, one-sixth of the commercial development in the nation occurred in the IE (Bluffstone and Ouderkirk, 2007). However, after the Great Recession wreaked havoc on most cities' tax bases, sustained logistics development became the lifeline to which many municipalities chose to cling. IE towns suffering from high rates of unemployment and poverty were promised that warehouses would provide plentiful jobs (Bonacich and De Lara, 2009). Consequently, the political leaders of some towns, such as Fontana and Ontario, have enacted especially pro-logistics legislation, creating a patchwork of warehouses at varying densities within the Inland Empire's urban center (Singh, 2021).

As a result of global as well as regional pressures to situate the IE as a logistics hub, it is estimated that the number of warehouses in the IE has ballooned from about 650 in the early 1990s to about 4,000 as of 2021 (Lee, 2022; Phillips and McCarthy, 2022). This rapid industry expansion has transformed employment opportunities and the built environment in the IE, and not necessarily for the better.

3.1.1 Labor Outcomes

Many labor scholars argue that the purported economic benefits of a warehouse-based regional economy have not been realized. As of 2016, only 40% of workers in the Inland Empire earned a living wage (UC Riverside Center for Social Innovation, 2018); as of 2009, 3% of IE warehouse workers–who are predominantly Latine–earned a living wage (Bonacich and De Lara, 2009). Currently in California, a living wage for an individual from a family of four with both parents working is about $30.50 (Glasmeier, 2022). Amazon warehouse workers are paid a starting wage of $16 and a maximum of $26 as of October 2022 (Palmer, 2022a). Despite growing rates of employment, as of 2016, poverty rates in Riverside and San Bernardino Counties were higher than before the Great Recession. Municipal leaders claimed that warehouse jobs would allow employees to avoid long commutes to Los-Angeles area jobs, but as of 2018, about 350,000 people were commuting to jobs outside of the area because of the lack of high-paying jobs in the IE (Roosevelt, 2018; UC Riverside Center for Social Innovation, 2018).

Furthermore, the proliferation of temporary work agencies in the region in line with logistics industry expansion has meant that growing numbers of workers are paid lower wages and omitted from regular employment benefits. Temporary workers are often hired only for the on-season when there is high consumer demand, such as during the holidays, and fired after demand lessens. “Temp” agencies employ tens of thousands of warehouse workers in the Inland Empire and are often the only means by which undocumented, predominantly Latine people can find work in the industry (Bonacich and De Lara, 2009;

De Lara, 2018).

Warehouse floor jobs are often dangerous and physically-exhausting due to repetitive actions lifting heavy boxes. Team leaders may push workers to work faster to meet company productivity targets to get goods out to consumers as fast as possible (De Lara, 2018; Long, 2022a). Consequently, Amazon, now the IE's largest private employer, has increased their serious work injury rates by 15% from 2020 to 2021 (Long, 2022b). In a year, nearly 7 in 100 Amazon warehouse workers suffer serious workplace injuries. Among other warehouse jobs, the rate isn't much better–over 3 in 100 suffer serious injuries every year (Palmer, 2022b).

Consequently, while new warehouses may offer more jobs, evidence suggests that these jobs do not pay well enough, do not offer enough financial security, and aren't safe enough to provide adequate employment for working families in the IE.

3.2 The Impacts of Warehouses on the Land and its Inhabitants

Classic studies such as the United Church of Christ's "Toxic Wastes and Race in the United States" and Robert Bullard's "Dumping in Dixie" laid the groundwork for the fundamental scenario for environmental injustice: the finding that, even when adjusted for income, hazardous waste facilities are disproportionately sited in Black and Brown communities (Bullard, 2018). The logic of racial capitalism that targets communities of color for exposure to pollution and thus, premature death extends beyond the siting of stationary hazardous waste facilities to include the siting of warehouses (Gilmore, 2007).

I distinguish the environmental injustices of warehouse siting in two categories: injustices which arise from proximity effects and those that arise from displacement effects. The majority of the described negative externalities of logistics industry activities in public

health and environmental justice literature are described in terms of proximity effects–that is, impacts to health and well-being that result from living in spatial proximity to the warehouse. Displacement effects occur when a warehouse is constructed and displaces a former land use. The dynamics of displacement significantly affect the well-being of people and ecosystems not only by way of the warehouse construction itself, but also through the foreclosure of possible future land uses.

3.2.1 Proximity Effects

Air pollution

Inland Empire residents living near warehouses, especially low-income Black and Latine households, are exposed to dangerously high levels of airborne pollutants as a result of diesel truck tailpipe emissions. PM2.5–airborne particulate matter less than 2.5 micrometers in diameter that can include heavy metals and hydrocarbons–is a primary component of traffic pollution (Lelieveld et al., 2015). PM2.5 particles can stay in the air for longer than other pollutants and are even able to enter the bloodstream because of their small size (Harrison et al., 1996; Sancini et al., 2014; Singhal et al., 2007). PM2.5 pollution results in hundreds of millions of yearly premature deaths worldwide by contributing to potentially preventable conditions such as cancer and heart attacks (Lelieveld et al., 2015; Sancini et al., 2014). Nitrogen dioxide (NO_2), another primary traffic pollutant, has also been linked to premature death from inhalation as well as reduced lung function in children (Gauderman et al., 2005; Jerrett et al., 2013). Ground-level zone, which is created from nitrogen oxides reacting with volatile organic compounds also found in vehicle emissions when exposed to sunlight, is linked with respiratory and cardiovascular illness (Stewart et al., 2017). NO_2, ozone, and PM2.5 are especially prevalent results of diesel emissions.

The Inland Empire has been found to have some of the worst particulate pollution and *the* worst ozone pollution in the country (American Lung Association, 2022). The

approximately 500,000 diesel trucks in the South Coast Air Basin[2] are the primary source of nitrogen oxides in the region (Stroik and Finseth, 2021; Scauzillo, 2021). A study by the California state government found that as of 2008, 3,700 Californians died every year from cancer related to diesel emissions exposure, while 18,000 Californians died annually from ambient diesel particulate matter exposure (De Lara, 2018). In the Inland Empire in particular, a 2007 study found that truck pollution contributes to between 32 and 64 yearly deaths and a health cost of up to 455 million dollars, equivalent to 81% of the logistics industry's wages at the time (Bluffstone and Ouderkirk, 2007). Susceptibility to asthma, to which young children are especially vulnerable, increases substantially with exposure to traffic pollution; one 2009 study found that hundreds of cases of childhood asthma in the city of Riverside alone are attributable to traffic proximity (Dharmage et al., 2019; McConnell et al., 2010; Perez et al., 2009). 71% of children under the age of 10 suffered from asthma in the IE as of 2021 (Singh, 2021).

It is in part because ambient air pollution produces bodily harm through invisible, slow-acting biological mechanisms that polluting entities and governments have historically avoided accountability for the deaths that they have caused (Nixon, 2011). It is important to be precise: responsibility for these deaths falls on middlemen logistics firms, retail companies such as Amazon, Walmart, Target, Lowe's, and Home Depot–who increasingly control the execution of both manufacturing and logistics practices via their proprietary shipping containers and transportation–and all levels of local, state, and national government in the preventable and disproportionate death and illness of predominantly Black and Latine communities in the IE.

Diesel trucks, the main source of pollution for warehouses, are a mobile pollution source, in contrast to stationary pollution sources such as smoke stacks and water runoff that are typical features of other hazardous waste facilities. As municipal air quality monitoring

[2]The South Coast Air Basin encompasses Los Angeles and Orange Counties and the urban areas of Riverside and San Bernardino counties to account for shared geographic and meteorological processes that contribute to air quality composition (California Environmental Protection Agency, 2012)

districts traditionally only have jurisdiction over stationary pollution sources, the mobile nature of warehouse pollution has made it difficult to pass legislation that regulates logistics-related pollution. As a result, statewide and municipal air quality monitoring entities are only able to make recommendations. For nearly two decades, it has been advised that warehouses be built at least 1000 feet from residences and schools, the distance at which around 80% of ambient pollution dissipates (California Environmental Protection Agency", 2005). However, legislative attempts to codify this requirement have failed, with politicians arguing that construction must continue freely because there are not enough industrial lease vacancies to meet demand (Esquivel, 2019).

A 2021 report by the People's Collective for Environmental Justice, confirmed by follow-up research by the South Coast Air Quality Management District (SCAQMD), provided striking evidence that the closer a neighborhood in the IE is to a large warehouse, the higher the proportion of low-income, Black and Latine people living in that neighborhood (Stroik and Finseth, 2021; Torres et al., 2021). The reports show that residents living within half a mile of warehouses suffer from higher rates of asthma and heart attacks. Despite the apparent nationwide success of the Clean Air Act, racialized communities in the IE now bear the majority of the air pollution burden in an area that has some of the worst air quality in the nation because of their communities' proximity to warehouse infrastructure (American Lung Association, 2022).

Other Proximity Effects

While air pollution is perhaps the best-researched proximity effect of warehouse activities, other detriments of warehouse activities are numerous. A single diesel truck moving at 40 miles per hour produces 84 decibels of noise when heard from 50 feet away (Purdue University Department of Chemistry, 2000). Because many warehouse truck loading docks operate 24 hours a day, nearby households risk hearing loss from the noise pollution produced by passing trucks (California Environmental Justice Bureau, 2022). Residential

roads can deteriorate from the constant truck traffic carrying heavy loads, and may not be repaired unless warehouse owners deem it necessary (California Environmental Justice Bureau, 2022).[3] Heavy-duty truck and passenger car traffic also endangers neighborhood residents by increasing the risk of collision with residential cars, pedestrians, cyclists, and children (California Environmental Justice Bureau, 2022; Waddell and Singh, 2021). Warehouse construction often fragments neighborhoods, impeding the neighborhood's sense of community by reducing the physical ease of access to neighbors' houses. Parents might tell their children that they are not allowed play outside, further isolating households inside the confines of their own properties (Lee, 2022).

3.2.2 Displacement Effects

By displacing other forms of land, warehouses remove the benefits of that former land use as well as foreclose the possibility of improving the benefits of the former land use. In comparison to other land uses, warehouses have a severely limited scope of environmental benefits. For this reason, warehouses have been called the "physical embodiment of a missed opportunity" (Waddell and Singh, 2021).

Housing is increasingly unaffordable in the Inland Empire. In September 2021, median rent was $1,577 in Riverside County, $1,342 in San Bernardino County, and $1,577 in Los Angeles County, closing the gap in cost of living between Southern California's metropolitan zip codes and the IE. The COVID-19 pandemic exacerbated housing precarity, with an estimated 36,000 IE households unable to pay their rents as of September 2021 (Angst et al., 2021). Housing shortages have been cited as the primary reason for the increase in home and rental prices, yet viewing regional housing unaffordability simply as a matter of supply and demand obscures the tendency of real estate developers and landlords to profiteer off vulnerable households by raising prices

[3] In some cases, roads may be repaired preventatively, creating a positive externality for nearby households, but this is not guaranteed.

relative to incurred costs. Gina Silva, a reporter for local news station Fox 11 Los Angeles, reports that rent for IE families is being raised arbitrarily, "just because they can." One family reported that their landlord increased their rent from 800 dollars to 2,600 dollars a month in the span of a year (FOX 11 Los Angeles, 2021). Silva connects growing housing unaffordability to the growing numbers of unhoused people in the IE (Yarbrough, 2022). By razing land in residential neighborhoods, logistics firms displace people who may be unable to find affordable housing elsewhere. Landlords may not obtain the consent of tenants to sell properties to warehouse developers.

Green spaces, which include residential backyards, urban parks, and natural areas, provide a range of benefits for the land and surrounding community. Urban green spaces have been found to be necessary for psychological health by providing shade and spaces for exercise, as well as promoting social cohesion between people who visit the space Jennings and Bamkole (2019). Depending on levels of intensification, residential backyards and agricultural land can also provide habitat for bird and pollinator species (Rudd et al., 2002; Usubiaga-Liaño et al., 2019). Warehouse construction paves most of the property with concrete and asphalt, which not only reduces green space or agriculture land Jantz et al. (2005), but also limits the extent of ecosystem services that the land can support in the future (Loures and Panagopoulos, 2007).[4]

3.3 Research Questions

While the proximity effects of warehouse development, such as air and noise pollution, are well-documented in the literature and in public media coverage, it is unknown which land uses are predominantly displaced by warehouse development and to what extent. In the following chapters, I consider the following research questions:

[4]Consider the disparity in hypothetical resources that would be expended converting a warehouse back into a green space compared to the resources it would take to make a backyard or vacant lot suitable for recreation or habitat for species.

1. Where in the Inland Empire has warehouse development expanded most in the Inland Empire over the past ten years?
2. How much land has been converted to warehouses in the past ten years?
   (a) How many residential properties? How much area?
   (b) How many agricultural properties? How much area?
   (c) Have rates of conversion changed from 2012 to 2017 to 2017 to 2022?

Chapter 4

Mapping Displacement

> If *Inventory* can be read as a systemic tabulation and enumeration of racial violence and death, it might also be read as speaking for life... *Inventory* documents and undoes the...linear progress toward unending death.
> – Katherine McKittrick, "Plantation Futures", 2013

4.1 Methodology

I invoke Katherine McKittrick's analysis of Dionne Brand's poem *Inventory* (McKittrick, 2013) at the beginning of this chapter to distinguish between the mere quantification of lives and land and what I am hoping to achieve by providing an "inventory" of the upheaval to (un)settled land and people in the Inland Empire. The analysis that follows is a first step in making legible the stories of people and land who have been displaced by warehouses which benefit the profit motives of mega-corporations.

This study applies a critical lens to Geographic Information Systems (GIS) work to quantify the amount and spatial extent of residential and agricultural land that has been converted into warehouse land between 2012 and 2022 in Riverside and San Bernardino

Counties, California.

4.1.1 Data Source

To determine the spatial distribution of warehouses, agricultural land, and residential homes in Riverside and San Bernardino Counties and to estimate land conversion patterns, publicly-available parcel data was obtained from the Assessor's Offices of each county. I chose datasets from three distinct years, equally spaced five years apart, for which I was able to directly compare distribution and conversion trends between San Bernardino and Riverside Counties: 2012, 2017, and 2022. This time period represents a decade's worth of changes in land use, which I evaluated in time steps of five years. This time period chosen because regional warehouse construction has increased especially in the past ten years.In total, I analyzed six distinct datasets of parcel data containing information about land use for each county for each year of evaluation. All calculations were performed in ArcGIS Desktop 10.8 (ESRI, 2022).

Present-day parcel data for Riverside County was downloaded from the County's Mapping Portal website as a shapefile containing land use information for each parcel (Riverside County Assessor's Office, 2022). Historical Riverside County land use data for 2012 and 2017 were purchased from the Riverside County Assessor's Office, while parcel shapefiles for 2012 and 2017 were supplied by the county's Geographic Information Systems Analyst. Land use datasets for 2012 and 2017 were then joined to the parcel data for respective years using the GeoCd and APN fields as join indices (Table 4.1). Most, but not all unique APNs were represented as unique parcel polygons, and most, but not all parcel polygons contained APN fields.

For San Bernardino County, present-day and historical parcel shapefiles were also provided by the county's Geographic Information Systems Analyst and downloaded from San Bernardino County's online GIS database (San Bernardino County Assessor's Office, 2022).

Table 4.1: Relevant fields for Riverside and San Bernardino Counties assessor parcel datasets

Field Name	Description	Type	Counties	Contained in
APN	9-digit code representing a unique parcel	Long integer	Both	all shapefiles
GeoCD	Equivalent to APN; used as index	Long integer	Riverside	historical csv files
TypeUse	4-digit land use code	Short integer	San Bernardino	all shapefiles
ClassCd	Description of land use	String	Riverside	historical csv files
CLASS_CODE	Equivalent usage to ClassCd	String	Riverside	2022 shapefile
Address fields (multiple)	City, street, zip, etc.; used to verify historical land use when available	varies	Both	all
Acreage	Parcel area reported in acres	Double	Both	all

Polygon shapefiles for San Bernardino contained land use information and did not need to be joined to additional datasets. All datasets for both counties were created using data from the months of June or July of a given year.

The San Bernardino County and Riverside County parcel shapefiles were in the Lambert Conformal Conic projection, with the Riverside datasets in the NAD 1983 StatePlane California VI FIPS 0406 Feet projected coordinate system and San Bernardino datasets in the NAD 1983 StatePlane California V FIPS 0405 Feet projected coordinate system. These are area-preserving projections which allowed parcel area estimates to be calculated accurately without creating map distortions. I calculated all parcel area measurements in acres.

4.1.2 Selections

Parcels were grouped into the following land use categories: residential, farmland, and warehouse. Land use category was determined based on the ClassCd and CLASS_CODE fields for Riverside County data and the TypeUse field for San Bernardino County data.4.1 I manually examined all unique ClassCd descriptions ($n = 346$) and TypeUse codes ($n = 286$) to sort entries into a particular land use category. I generated keywords based on

terms relating to residential living, agriculture, or warehouses found within the counties' land use description lists.

Table 4.2: Keyword selection queries for each land use category

Land use category	Riverside County	San Bernardino County
Residential	"ClassCd" LIKE '%RV %' OR "ClassCD" LIKE '%plex%' OR "ClassCD" LIKE '%Assisted Living%' OR "ClassCD" LIKE '%Condo %' OR "ClassCD" LIKE '%Apartment %' OR "ClassCD" LIKE '%Single Family%' OR ("ClassCd" LIKE '%Resident%' AND NOT "ClassCd" LIKE '%Vacant%') OR "ClassCd" LIKE '%Home%' OR "ClassCd" LIKE '%MH %' OR "ClassCD" LIKE '%SFR%'	("TYPEUSE" >700 AND "TYPEUSE" <776) OR "TYPEUSE" = 779 OR "TYPEUSE" = 799 OR "TYPEUSE" = 817 OR "TYPEUSE" = 827 OR "TYPEUSE" = 837 OR "TYPEUSE" = 847 OR "TYPEUSE" = 857 OR "TYPEUSE" = 867 OR "TYPEUSE" = 879 OR "TYPEUSE" = 952
Agricultural	"ClassCd" LIKE '%Citrus%' OR "ClassCd" LIKE '%Greenhouse%' OR "ClassCd" LIKE '%Avocado%' OR "ClassCd" LIKE '%Livestock%' OR "ClassCd" LIKE '%Ranch%' OR "ClassCd" LIKE '%Vineyard%' OR "ClassCd" LIKE '%Farm%' OR "ClassCd" LIKE '%Agricultur%' OR "ClassCd" LIKE '%Date Garden%' OR "ClassCd" LIKE '%Asparagus%'OR "ClassCd" LIKE '%Jojoba%' OR "ClassCd" LIKE '%Permanent Planting%'	"TYPEUSE" = 1 OR "TYPEUSE" = 333 OR "TYPEUSE" = 335 OR "TYPEUSE" = 336 OR "TYPEUSE" = 337 OR "TYPEUSE" = 510 OR ("TYPEUSE" >513 AND "TYPEUSE" <524) OR ("TYPEUSE" >524 AND "TYPEUSE" <533) OR ("TYPEUSE" >533 AND "TYPEUSE" <640) OR "TYPEUSE" = 650 OR "TYPEUSE" = 825 OR "TYPEUSE" = 826 OR "TYPEUSE" = 835 OR "TYPEUSE" = 836 OR "TYPEUSE" = 845 OR "TYPEUSE" = 846 OR "TYPEUSE" = 856 OR "TYPEUSE" = 859 OR "TYPEUSE" = 869
Warehouse	("ClassCd" LIKE '%Warehouse%' OR ("ClassCd" LIKE '%Light Industrial%' AND Acreage >3.444)) AND Acreage >1.000	("TYPEUSE" = 0100 OR "TYPEUSE" = 0101 OR "TYPEUSE" = 0102 OR "TYPEUSE" = 0103 OR ("TYPEUSE" = 0113 AND Acres >3.444) OR "TYPEUSE" = 0301 OR "TYPEUSE" = 4303 OR "TYPEUSE" = 4304 OR "TYPEUSE" = 4305 OR "TYPEUSE" = 0109) AND Acreage >1.000

I designated parcels as residential land if the land use description indicated that the property was intended as a permanent living space. For example, parcels containing the keywords "SFR" (Single Family Residence) or "Manufactured Home Park" were included, while "Dormitory" or "Hotel" were excluded.

Similarly, I designated parcels in the agricultural land category if the land use description indicated that the property was used for any activity related to agriculture or animal husbandry. Parcels in this category include dairy farms, fruit orchards, and crop storage facilities. Parcels with mixed-use residential and agricultural land use descriptions were also included in the agricultural category, but excluded from the residential category, to more accurately assess residential displacement patterns.

Parcels were designated as warehouses according to the Robert Redford Conservancy and Radical Research LLC's Warehouse CITY tool methodology (version *alpha v.109*) (Phillips and McCarthy, 2022). I employed this methodology because I am primarily interested in warehouses which have systematic displacement impacts, which is addressed by only considering warehouses larger than one acre.[1] "Light Industrial" parcels are only considered warehouses if they are over 150,000 square feet (3.444 acres).

After the land use keyword queries were applied, each selection for a particular land use category for a particular year was exported as its own shapefile for further analysis (Allen, 2010; Phillips and McCarthy, 2022). I repeated the selection process for data from 2012, 2017, and 2022 to generate parcel-level land-use categorizations for both counties.

4.1.3 Spatial Calculations

I first derived a summary of the count and area of parcels of a particular land use category for the purpose of evaluating the overall dynamics of land use changes relative to conversion patterns. To estimate land conversion amounts for 2012 to 2017 and 2017 to 2022, I used the ArcGIS "Intersect" tool to produce a geometric intersection of the parcels of a particular land use category for one year (i.e. residential and agricultural) with the parcels of the subsequent year. The "Intersect" tool retains the acreage measurements of the original parcels for the purpose of analysis. I summarized the conversion amounts for each category of land use conversion as well as the number of parcels belonging to unique land use descriptions.

In using the Intersect tool, I assumed that for conversion to agricultural land, there would not be more than one new warehouse parcel contained within the spatial bounds of the old land use type (residential or agricultural). This allowed me to demonstrate conversion rates

[1] In other words, while small (sub one-acre) warehouses are a significant addition to the warehousing and logistics infrastructure in the Inland Empire, their dynamics are quite different from that of larger warehouses which tend to displace significant amounts of land in a single project proposal.

and patterns for residential to warehouse land, agricultural to warehouse land, as well as agricultural to residential land. Agricultural to residential land conversion, which has been demonstrated as a significant local phenomenon in recent years, was used as a comparison as well as to determine overall land use changes in the study area. However, because residential parcels are overwhelmingly smaller than agricultural parcels on average, the Intersect tool failed to capture unique residential parcels in distinct agricultural polygons. Thus, I relied on preserved area estimates for agricultural parcels that were identified as converted, rather than the number of polygons themselves, to estimate conversion amounts. I assumed that any new residential overlap with the old parcels represented a conversion for the entirety of the agricultural parcel.

To visualize the spatial patterns of parcels that were converted for 2012 to 2017 and 2017 to 2022, I used the "Spatial Join" tool to extend the intersection to reflect the reality of the area of the parcels affected. This tool was primarily used for visualization of the spatial distribution of conversion patterns. I used a tool tolerance of 0 feet to avoid over-representing the spatial extent of converted land in map figures.

I observed from visual analysis in ArcMap that the majority of this displacement occurred within towns that were relatively close to transportation corridors comprising major highways and rail routes, as opposed to isolated rural areas with low population density. However, because of the large spatial extent of the study area, to estimate the numbers of people displaced from their homes by warehouse expansion, I developed a conservative conversion metric derived from the average of the population densities of five semi-rural Inland Empire towns that were selected for their relative proximity to interstates based on 2010 and 2020 census data (United States Census Bureau, 2021) (Appendix Table 1.1). For a less conservative estimate, I calculated the average of the population densities of five of the most populous cities in the Inland Empire for 2010 and 2020. 2012 population displacement estimates were thus calculated using estimates from 2010 census data, while

2017 estimates were calculated using 2020 census data.

When analyzing the distribution and conversion patterns of parcel land use categories, I assumed that all parcel data reporting for Riverside and San Bernardino Counties was accurate, because of the need to accurately assess parcel coverage for property tax and policy-making purposes. Land use description categories was almost entirely consistent from 2012 to 2022 for both counties. Therefore, I regarded the observed changes in the spatial distribution and amount of residential, agricultural, and warehouse parcels as accurately representing land use changes occurring in reality.

Lastly, I used Google Earth Pro to observe historical land use changes for selected known warehouse sites in the Inland Empire using the addresses of known warehouses obtained from parcel datasets. I used the historical imagery tool to observe how quickly warehouses replaced residential neighborhoods or farmland after they disappeared. This methodology was performed using a select few addresses to confirm whether there are significant instances of conversion in which there is no intermediate land use between the initial land category (i.e. residential or agricultural) and the final warehouse land.

4.2 Results

4.2.1 Distribution Patterns

In both Riverside and San Bernardino Counties, the number of warehouse parcels increased from 2012-2022. The percent increase in number of warehouses remained relatively constant for Riverside County over both five-year periods at around 10.5%; this was similar to the rate of warehouse parcel increase for San Bernardino County in 2017 to 2022, but for the latter county, the growth rate for 2012 to 2017 was much lower, at about 3.9% (Table 4.3). In terms of area, the percent of total land in Riverside County occupied by warehouses has steadily risen since 2012 from 0.22 to 0.33%–representing a 5000 acre

increase; this is a similar trend to that of San Bernardino County, which has seen an increase in warehouse area from 0.15 to 0.19%.

The number of residential parcels also increased in both counties from 2012 to 2022, with residential parcels growing at a rate of 1.8% from 2012 to 2017 and 3.9% in 2017 to 2022, and growing in Riverside County at a rate of about 4% in both five-year time periods (Table 4.5). However, the total residential acreage fell for Riverside County, from 7.11% of the total county's land in 2012 to 6.63% in 2017, and increasingly slightly in 2022 to 6.83%. In San Bernardino County, the percentage of the county occupied by residential land has stayed nearly constant, from 2.38% in 2012 and 2017 to 2.54% in 2022. Mean residential parcel size has decreased slightly in Riverside County from 0.55 to 0.49 acres between 2012 and 2022, while the same measure has stayed roughly constant for San Bernardino County, at about 0.57 acres.

The total number of agricultural parcels in Riverside County increased over time, while in San Bernardino County, they decreased (Table 4.3). The number of agricultural parcels increased by 3.8% between 2012 and 2017 and by 15.2% in 2017-2022. This contrasts sharply with San Bernardino County, in which agricultural land decreased by 17% in both five-year time spans. In other words, 31.2% of all agricultural properties in 2012 in San Bernardino County are no longer in existence. In terms of area, the percent of Riverside County occupied by agricultural land has increased somewhat from 13.3% in 2012 to 14.3%, while in San Bernardino County agricultural land has fallen from 0.34% to 0.25% of the county's total acreage. In other words, there has been a 31.0% reduction in agricultural land area from 2012 to 2022 in San Bernardino County.

Table 4.3: Changes in parcel area for residential, agricultural, and warehouse land in Riverside and San Bernardino Counties

Year evaluated	land use category	parcel count	% change in parcel count	min parcel size (acres)	max parcel size (acres)	% change in max parcel size	total parcel area (acres)	% of total county land	% change in total parcel area	mean parcel size (acres)	% change in mean parcel size
Riverside County											
2012	residential	578684	NA	0.00	679.42	NA	319335.62	7.11	NA	0.55	NA
	agricultural	16184	NA	0.00	2568.59	NA	598263.46	13.32	NA	36.97	NA
	warehouse	1156	NA	1.00	128.23	NA	10025.63	0.22	NA	8.67	NA
2017	residential	603084	4.05	0.00	679.42	0.00	301744.97	6.63	-5.83	0.50	-10.29
	agricultural	16831	3.84	0.00	2568.59	0.00	611125.00	13.43	2.10	36.31	-1.81
	warehouse	1289	10.32	1.00	660.87	80.60	12741.32	0.28	21.31	9.88	12.26
2022	residential	630329	4.32	0.00	6126.00	88.91	309905.35	6.82	2.63	0.49	-1.77
	agricultural	19847	15.20	0.00	2568.59	0.00	650275.32	14.30	6.02	32.76	-10.82
	warehouse	1445	10.80	1.01	655.52	-0.82	15029.90	0.33	15.23	10.40	4.97
San Bernardino County											
2012	residential	537087	NA	0.00	682.26	NA	304057.95	2.38	NA	0.57	NA
	agricultural	1823	NA	0.00	785.63	NA	42852.03	0.34	NA	23.51	NA
	warehouse	2471	NA	1.00	654.03	NA	18762.72	0.15	NA	7.59	NA
2017	residential	546873	1.79	0.00	682.26	0.00	304970.65	2.38	0.30	0.56	-1.52
	agricultural	1560	-16.86	0.00	785.63	0.00	35349.40	0.28	-21.22	22.66	-3.74
	warehouse	2570	3.85	1.00	654.03	0.00	20605.12	0.16	8.94	8.02	5.29
2022	residential	568768	3.85	0.00	3176.63	78.52	325720.60	2.54	6.37	0.57	2.62
	agricultural	1328	-17.47	0.00	785.63	0.00	31433.91	0.25	-12.46	23.67	4.27
	warehouse	2884	10.89	1.00	654.03	0.00	24043.70	0.19	14.30	8.34	3.83

4.2.2 Conversion Patterns

Residential to warehouse, agricultural to warehouse, and agricultural to residential conversion rates all increased from 2012 to 2017 to 2017 to 2022. From 2012 to 2022, roughly 850 acres of residential land were converted to warehouse land in Riverside County and 640 acres in San Bernardino County; this area represents 307 residential properties in Riverside County, and 302 in San Bernardino County, that were converted into warehouse land (Table 4.4). The rate of conversion spiked in Riverside County from 2012 to 2017, with 13 acres converted, to 2017 to 2022, with 835 acres converted. In San Bernardino, the increase in rate of conversion was less, but still substantial, going from 257 acres converted between 2012 and 2017 to 383 acres converted from 2017 to 2022.

Residential to Warehouse

The mean size of converted residential parcels decreased substantially from 2012 to 2022 for both counties, while the standard deviation of converted residential parcels increased for Riverside County and decreased slightly decreased for San Bernardino County. Notably, only 2 residential parcels in 2012–one mobile home and one single family residence–were converted to warehouse land by 2017 in Riverside County, while 100 residential parcels–mostly single family homes–were converted during the same time frame in San Bernardino County (Tables 1.3 and 1.5). From 2017 to 2022, mostly single family residences were identified as converted in both Riverside and San Bernardino Counties. In San Bernardino County, residential land conversion became more concentrated in the Inland Empire's urban center in 2017 to 2022 than in 2012 to 2017 (Figures 4.1 and 4.2).[2] In Riverside County, residential conversion was much more dispersed.

[2]I define the urban center as the urbanized stretch of land directly east of Pomona and Chino to Yucaipa and including other large cities such as Ontario, Fontana, Riverside, and San Bernardino.

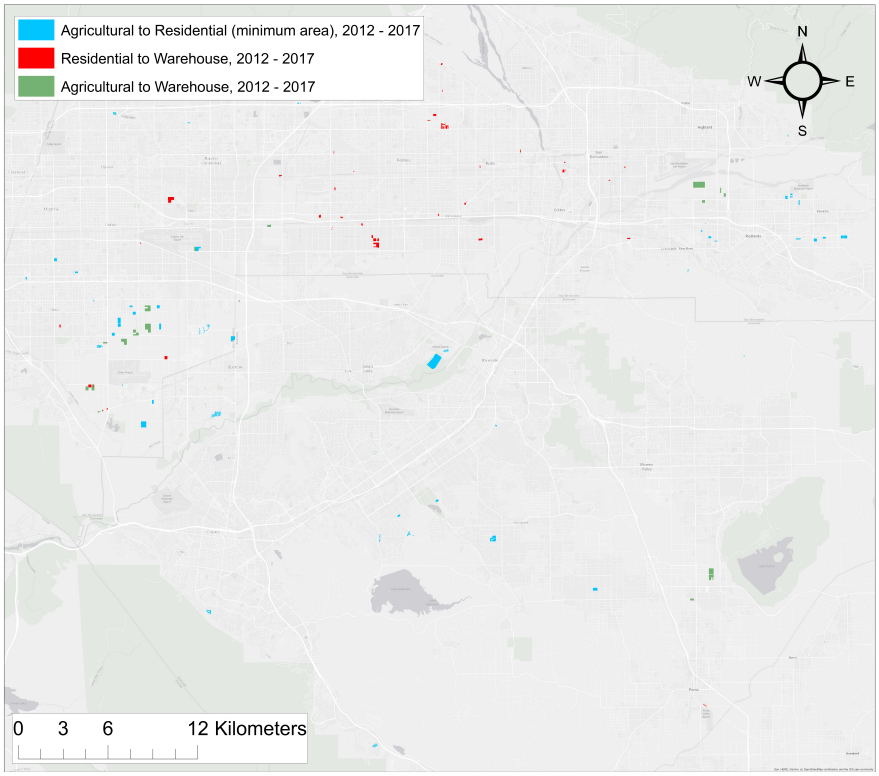


Figure 4.1: 2012 to 2017 residential, agricultural, and warehouse conversion patterns

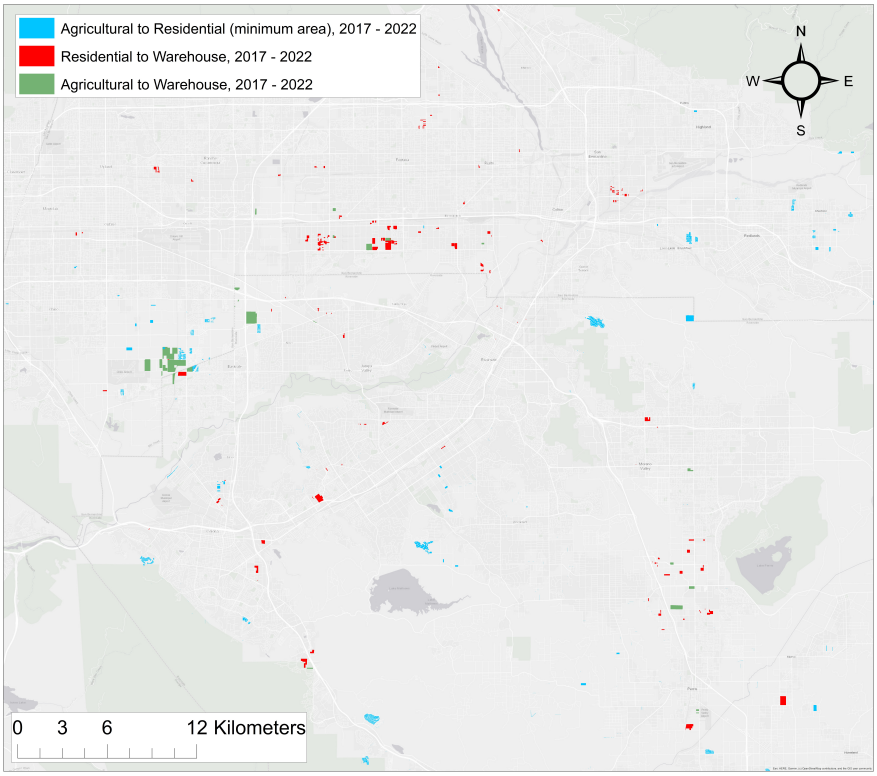


Figure 4.2: 2017 to 2022 residential, agricultural, and warehouse conversion patterns

Agricultural to Warehouse

Conversion of agricultural land to warehouse land followed similar patterns to the conversion of residential land to warehouse land. A key difference, however, is that fewer agricultural parcels than residential parcels overall were converted to warehouse land from 2012 to 2022, even though the total acreage of converted agricultural land was much greater than that of residential land. A total of 1,320 acres in Riverside County, and 1,264 acres in San Bernardino County, were converted from agricultural use to warehouses. About 80% of this conversion happened between 2017 and 2022.

In Riverside County, most converted agricultural parcels for all of 2012 to 2022 were of the land use description "Vacant Land - Predominate Agricultural Use" (n = 18); from 2017 to 2022, "Irrigated Farmland" was also a leading land use description for converted parcels (n = 9) (Appendix Tables 1.3 and 1.4). In San Bernardino County, the three most converted agricultural land use descriptions were "Citrus" (n = 7), "Row Crops" (n = 6), and Livestock (n = 6) for 2012 to 2017. For 2017 to 2022, converted agricultural parcels were mostly "Dairy" (n = 34) or "Field Crops" (n = 12) (Appendix Table 1.5). In contrast to converted residential parcels, the mean converted agricultural parcel size increased substantially from 2012 to 2017 to 2017 to 2022 in both counties, with mean parcel size more than doubling for San Bernardino County. For Riverside County, agricultural to warehouse land conversion from 2012 to 2022 was dispersed in pockets throughout the county, while in San Bernardino County, all agricultural to warehouse land conversion occurred in the urban center of the IE.

Agricultural to Residential

Agricultural to residential conversion rates exceeded both residential to warehouse and agricultural to warehouse rates. Agricultural to residential conversion acreage increased drastically between 2012 to 2017 and 2017 to 2022 for Riverside County, from 1,880 acres

to 16,450 acres, but slightly decreased for San Bernardino County, from 1,420 acres to 1,215 acres in the same time frames. For Riverside County, the vast majority of agricultural land converted to residential land was of the land description "Vacant Land - Predominate Agricultural Use" (n = 1142) in 2012 to 2017; in 2017 to 2022, the vast majority of agricultural parcels were of the "Vacant Land - Predominate Agricultural Use" (n = 5056) or "Agricultural Land - Transitional" (n = 3042) descriptions (Appendix Tables 1.3 and 1.4). In San Bernardino County, the leading land use descriptions for converted agricultural to residential land for both 2012 to 2017 and 2017 to 2022 were "Dairy" (n = 327 and n = 982, respectively) and "Citrus" (n = 175 and n = 638, respectively) (Appendix Table 1.5).

Importantly, from 2017 to 2022, the total amount of agricultural or residential land converted to warehouse land in San Bernardino County exceeded the amount of agricultural land converted to residential land, whereas from 2012 to 2017 the total agricultural or residential warehouse conversion area was less than a third of the conversion area of agricultural to residential land.

Ontario, California

As a sample of land use distribution and conversion patterns at the city scale, I evaluated Ontario, California, a city in the urbanized area of the IE that has been the subject of recent media coverage for increased warehouse expansion. In 2012, there were 572 warehouses encompassing 4,360 acres, which increased to 667 warehouses encompassing 5,144 acres in 2022. From 2012 to 2017, 80 acres of agricultural land and 12 acres of residential land were converted to warehouses. From 2017 to 2022, rates of conversion increased, with 809 acres of agricultural land and 7 acres of residential land converted to warehouses.

Table 4.4: Conversion summary for residential, agricultural, and warehouse parcel groupings for Riverside and San Bernardino Counties from 2012 to 2022

Region	**Years**	**Conversion**	**parcel count**	**minimum parcel area converted (acres)**	**maximum parcel area converted (acres)**	**total parcel area converted (acres)**	**mean parcel area converted (acres)**
Riverside County	2012-2017	Residential to Warehouse	2	2.18	11.10	13.29	6.64
		Agricultural to Warehouse	7	1.76	29.72	124.25	17.75
		Agricultural to Residential	1786	0.08	260.43	1876.23	1.05
	2017-2022	Residential to Warehouse	305	0.09	62.57	835.07	2.74
		Agricultural to Warehouse	49	0.70	135.93	1195.67	24.40
		Agricultural to Residential	10592	0.00	656.63	16450.31	1.55
San Bernardino County	2012-2017	Residential to Warehouse	100	0.17	27.30	256.98	2.57
		Agricultural to Warehouse	28	1.90	25.02	236.95	8.46
		Agricultural to Residential	664	0.02	162.54	1421.49	2.14
	2017-2022	Residential to Warehouse	202	0.14	40.27	383.27	1.90
		Agricultural to Warehouse	60	1.42	74.22	1027.35	17.12
		Agricultural to Residential	1676	0.02	249.69	1215.02	0.72

4.2.3 Conceptualizing Displacement

Residential Displacement

In Riverside County, approximately 850 acres were converted from residential land to warehouses between 2012 and 2022. Assuming no intermediate land use, this accounts for abontout 2,370 people displaced over the past ten years using a conservative rural population density conversion metric, while assumptions of urban density account for 4,350 people displaced over the same time span (Table 4.5). In San Bernardino County, about 660 acres of residential land became warehouse land between 2012 and 2022. This accounts for 1,700 people displaced by a conservative rural estimate and 3,370 people displaced using assumptions of urban density (Table 4.5).

Table 4.5: Displacement estimates for residential land converted to warehouses in five-year time steps. Does not include mixed residential-agricultural land.

County	Years	total residential area converted (acres)	number of people displaced (rural estimate)	number of people displaced (urban estimate)
Riverside County	2012-2017	13.29	33	73
	2017-2022	835.07	2333	4283
San Bernardino County	2012-2017	256.98	631	1408
	2017-2022	383.27	1071	1966

Google Earth historical imagery shows that in at least three cases, warehouses directly displaced residential neighborhoods and construction was completed within a couple of years after houses were razed. The Amazon LAX9 fulfillment center in Fontana, California is a striking case study of how such development projects happen (Wulfraat, 2022). For decades, the land was home to low-density single family homes with significant green space. The entire block was razed sometime between February and August 2018, with the warehouse constructed from start to finish between August 2018 and August 2019 (Figs. 4.3b and 4.3c). Dozens of homes with potentially hundreds of people were displaced as a result. Dozens of acres of green space were also lost.

It is probable that the owners of the buildings in the southeastern corner of the new

warehouse refused to sell their homes, forcing the warehouse to build around them. These residences are directly adjacent to LAX9's parking lot (Figure 4.4). Only marginally better off are the residences across the street, who have an approximately 10-meter-wide vegetation barrier which appears to be built especially to mitigate impacts from idling diesel trucks, and no barrier separating them the major road that likely facilitates near-constant truck entry to the warehouse facility. This particular warehouse is estimated to accommodate 2,300 incoming diesel trucks every day, which equivalent to an average of 1.6 trucks every minute (Wulfraat, 2022).

Agricultural Displacement

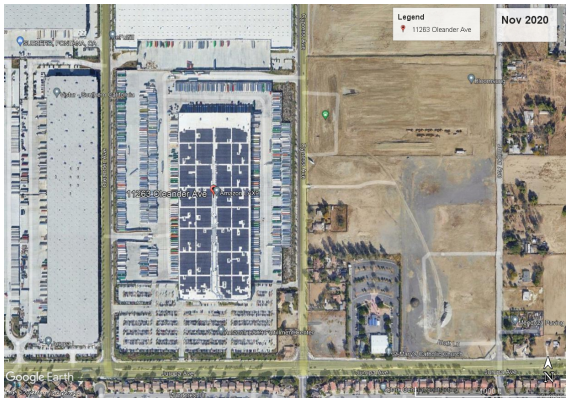
In another instance, warehouses were also shown to displace agricultural land. In Chino, a collection of warehouses including the Amazon sorting center CNO5 were built next to the Chino Airport over the course of about eight years. It appears that the land on which the Amazon warehouse and two other warehouses built may have been vacant or fallow, though it is clear that most of the other parcels were actively farmed (Figure 4.6a). The Amazon warehouse was the first to be built (Figure 4.6b); the warehouse on the eastern third of the map extent followed (Figure 4.6c), and parcels on the edges of the map extent were built last (Figure 4.6d). There are no residential properties or other forms of land use evident in this area, suggesting that residential real estate development firms does not compete with logistics firms in this area. It is also notable that the Amazon warehouse was built alongside two other warehouses for different companies on the same original parcel (Figure 4.6b).

With the "inventory" of the IE's warehouse distribution and land use conversion patterns from 2012 to 2022 that I have provided here, the following chapter addresses potential mechanisms and implications for the dynamics of local warehouse expansion.

(a) February 2018

(b) August 2018

(c) August 2019



(d) November 2020

Figure 4.3: Construction of Amazon LAX9 fulfillment center in which residential blocks were razed and the warehouse constructed within a span of two years. Images courtesy of Google (Google, 2022a)

Figure 4.4: The southeast corner of Amazon's LAX9 fulfillment center. Residents who declined to sell their homes are now located only a few dozen meters from the loading docks, where an estimated 2,300 diesel truck visit every day (Wulfraat, 2022). Image courtesy of Google Earth Pro (Google, 2022a)

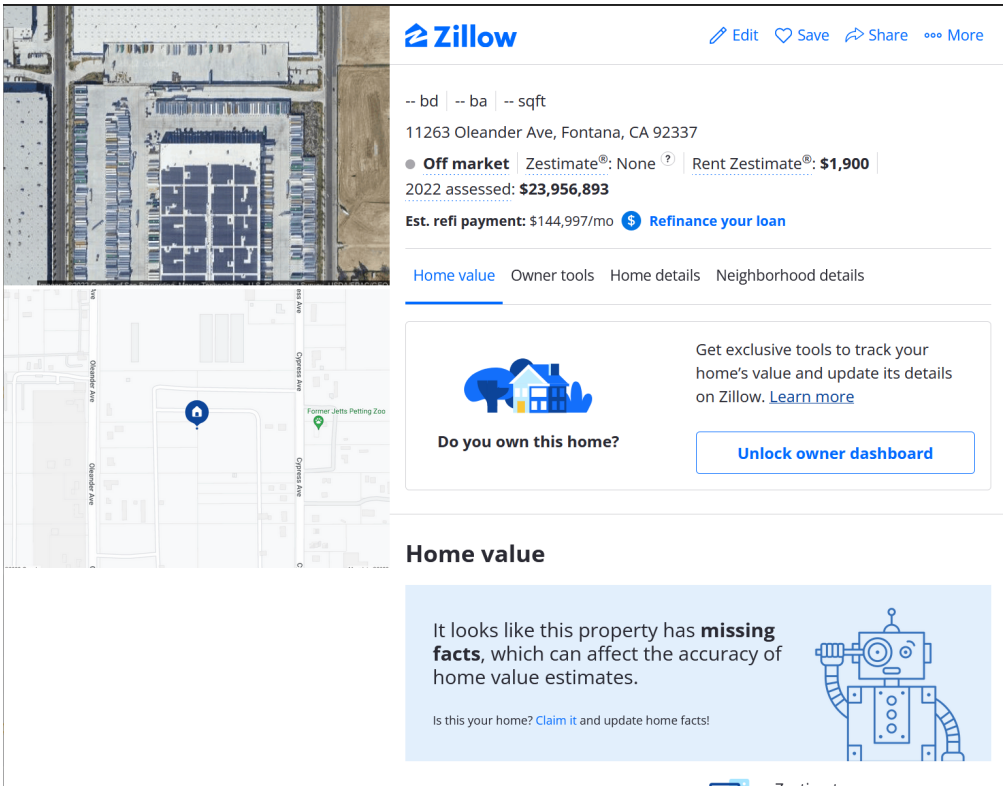
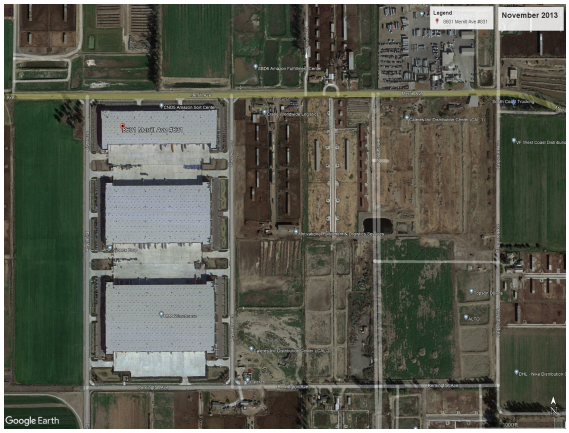
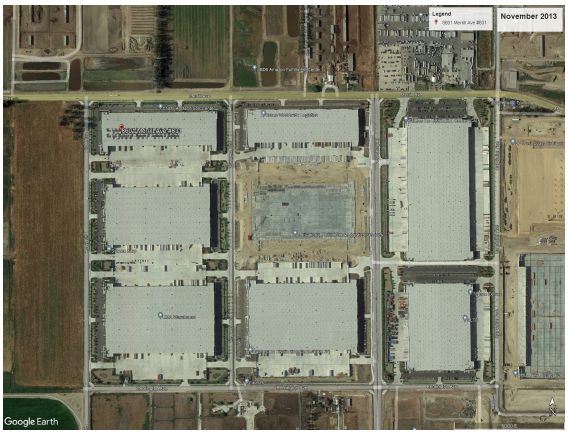


Figure 4.5: 11263 Oleandor Drive is still listed off-market on Zillow, a real estate and rental advertising website, as a "residence", priced at 24 million dollars.

(a) November 2013



(b) February 2016



(c) May 2019

(d) January 2021

Figure 4.6: Construction of the Amazon CNO5 sortation center (red icon) and surrounding warehouses adjacent to the Chino Airport. Nearly all agricultural plots in the map extent were razed in less than ten years. Images courtesy of Google Earth Pro (Google, 2022b)

Chapter 5

Land is Life: Visions of a Future Inland Empire

> We could've done so many great things here, things that could've helped the community...We could do better.
> –Alfredo Romo, executive director of Neighbors for Environmental Justice in Chicago[1]

5.1 Analysis of Findings

5.1.1 Distribution

I calculated a total of 4,300 warehouses over 1 acre in the Inland Empire as of 2022 (Table 4.3), an estimate which roughly reflects recent reporting and the SCAQMD's estimate that there are about 3,995 warehouse operators over 100,000 square feet (equivalent to 2.2 acres) in the South Coast Air Basin (Guilhem, 2022; Stroik and Finseth, 2021). The amount of land occupied by warehouse parcels increased more from 2017 to 2022 than it

[1] Waddell and Singh (2021)

did from 2012 to 2017 for both counties. This increase is likely related to Amazon's warehouse construction frenzy over the COVID-19 pandemic, during which they increased their count of Southern California warehouses from 9 to 32 in a single year, most of which are located in the Inland Empire (Levin, 2021; Collins, 2021).

Mean warehouse size increased between 2012 and 2017 and between 2017 and 2022 for both counties, which indicates that warehousing projects are on average getting larger. In 2019, 20 of the largest 100 logistics leases signed nationwide were in the Inland Empire (California Environmental Justice Bureau, 2022), and a 2019 Los Angeles Times report also found that warehouse projects in the IE are increasing in size (Esquivel, 2019). As online shopping increasingly dominates consumer behavior (Jaller and Pahwa, 2020), rising consumer demand necessitates higher inventory turnover and thus justifies larger warehouse projects (De Lara, 2018). It should be noted that this is only possible through county and municipal zoning proposals which permit warehouses up to a certain size to be built (California Environmental Justice Bureau, 2022).

5.1.2 Residential Displacement

I estimated that more people were displaced in the time frame between 2017 and 2022 than in 2012 to 2017. Furthermore, former agricultural land-turned warehouse land became more concentrated in the IE's most populous areas in 2022 than in 2017 for San Bernardino County, and the mean size of converted residential parcels decreased substantially from 2012 to 2022 for both counties, which may indicate that warehouses are increasingly being built in areas with higher population densities compared to ten years ago. This initial finding should be further evaluated, but hints at a troubling trend of warehouses encroaching on urban residential areas. Reports from early 2022 note that new warehouse construction projects in the IE are influenced by the scarcity of vacant leases for existing warehouse space as well as significant rent increases for the same spaces (Rogers, 2022). Warehouse developers prioritize siting warehouse facilities near existing highways

and railroad networks, but as the availability of existing industrial real estate near transportation infrastructure decreases, developers may begin to identify residential neighborhoods as ideal for development.

5.1.3 Agricultural Displacement

Agricultural land in Riverside County covered a much larger area than in San Bernardino County based on parcel land use information. This might be reflective of Riverside County as historically more agriculture-heavy (Moses, 1995), but this disparity is more likely a result of different land use descriptions that result in a more expansive definition of "agriculture" in Riverside than in San Bernardino County (see Section 5.1.5). Nonetheless, comparable areas of agricultural land were converted to warehouse land between Riverside and San Bernardino Counties, with rates of conversion increasing for both counties from 2012 to 2022. Consequently, as of 2017, there were still adequate amounts of agricultural land deemed desirable for warehouse development, indicating that the IE is still in the process of urbanization (Martellozzo et al., 2015). In Riverside County, agricultural to warehouse land conversion from 2012 to 2022 was dispersed in pockets throughout the county, while in San Bernardino County, all agricultural to warehouse land conversion occurred in the urban center of the IE. This pattern may result from the underlying distribution of farmland in the region, with most of the northern and eastern areas of San Bernardino County too dry for farming to occur at a significant scale (California Department of Conservation, 2022).

Importantly, in both Riverside and San Bernardino Counties, a larger area of agricultural and residential land was converted to warehouse land than the area of agricultural land converted to residential land between 2017 and 2022. This is reflective of the growing influence of the logistics industry on regional land development in addition to residential real estate development. Rates of agricultural to residential land conversion increased significantly in Riverside County from 2012 to 2017 to 2017 to 2022, indicating that

residential development displaces more agricultural land than warehouse development as of 2017, but again, much of this is the conversion of "potential" agricultural land as opposed to actively farmed residential land (See Section 5.1.5). Thus, observed agricultural to residential land conversion in Riverside County may be an indication of further residential urban sprawl into undeveloped rural areas.

5.1.4 Implications

Warehouse proximity effects such as air and noise pollution have already been found to impact Black and Latine neighborhoods disproportionately, so I hypothesize that residential displacement from warehouse construction also disproportionately affects communities of color (Stroik and Finseth, 2021; Torres et al., 2021). The "minority move-in hypothesis" suggests that economically-disadvantaged minorities follow polluting industries by moving into cheap neighborhoods, as opposed to polluters targeting communities of color. In their evaluations of "traditional" hazardous waste facilities, a number of classic environmental justice studies have demonstrated that "minority move-in" is overshadowed by the siting choices of polluters (Bullard et al., 2008; Brulle and Pellow, 2006; Pastor et al., 2001). In the case of warehouse siting in the Inland Empire, if the hypothesis that the demographics of people displaced correlate strongly with the demographics of people in closest proximity to warehouses–i.e., Black and Latine households–is correct, then observed trends of significant residential displacement by warehouse projects severely discredits the"minority move-in" hypothesis. This hypothesis can be verified using neighborhood census block demographic estimates from the American Community Survey, which is a necessary next step of this analysis (United States Census Bureau, 2022).

Warehouses are built on former private properties when property owners are offered a payout from the logistics real estate developer in exchange for giving up their homes and moving elsewhere. The time scale on which this occurs appears to be quick, as satellite evidence demonstrates that neighborhoods are razed and warehouses–often consisting of

dozens or hundreds of acres–are constructed in their place in a matter of a few years. The factors influencing a family's decision to move from their home are complex and not able to be accounted for using my methodology, but uncovering the stories of those displaced is essential to understanding the human dimensions of displacement.

SB 330, also known as the 'Housing Crisis Act of 2019', is a state law dictates that any project involving demolition of mid to low-income housing must replace the lost housing elsewhere. It also requires that displaced residents be provided with relocation assistance (State of California, 2019; Collins, 2019). By targeting low-income housing, SB 330 ensures that those most vulnerable to logistics displacement are able to stay housed. However, the bill was only signed into law in late 2019, well after residential displacement became a significant issue in the IE. Prior to 2019, displaced households may not have been given any assistance to find new housing. SB 330 does not guarantee that development firms will offer households a fair price. One interviewee said that when a firm approaching her and her neighbors for a development deal, "the majority [of homeowners] didn't want to sell because they were offering very little" (Esquivel, 2019). Nor does the bill address the often imbalanced power dynamics of landlord-tenant interactions in which landlords have the ultimate say in selling their property without the approval of their tenants. Furthermore, the bill expires in 2025, potentially leaving even more people at risk of displacement than before if new legislation with the same protections fails to be enacted.

Even if the material impacts of displacement are addressed, proximity effects can still remain. One 213-acre warehouse development project in Bloomington, an unincorporated community south of Fontana whose primarily Latine residents take pride in their community's rural equestrian lifestyle, was approved in 2022 by the San Bernardino County Board of Supervisors to displace over 200 people, despite vocal opposition from community members (Yarbrough, 2022). The project will rezone the area to replace low and very-low density homes with medium density housing to make up for lost housing.

However, maps of the development project indicate that the higher-density housing will be built across the street from proposed warehouses (EPD Solutions, Inc., 2021).

Regardless of differences in timeline and negotiation procedures for displaced neighborhoods between municipalities in the IE, the fact remains that the roughly 40% of IE residents who do not own their homes are especially vulnerable to warehouse development projects (United States Census Bureau, 2021). Media interviews with residents of neighborhoods in close proximity to new warehouse development projects have become increasingly common and have even achieved national coverage beginning around 2021. What is sorely missing is the telling of stories from the former residents of those neighborhoods who sold their homes to developers.

A larger amount of agricultural land was converted to residential land or warehouse land than the amount of residential land that was converted to warehouse land in either Riverside or San Bernardino Counties. This pattern demonstrates the role of urbanization in general in replacing agricultural land use regimes, which has been documented across urbanizing regions worldwide (Chen et al., 2010; Martellozzo et al., 2015). While I found that most converted agricultural land did not include mixed agricultural and residential land uses, farmers may still be indirectly displaced if their farmland is bought out, even if their homes are not (Singh, 2022). Agricultural displacement incentivizes farmowners to move out-of-state or to stop farming altogether, which increases reliance on neoliberal modes of food production that benefit massive national and transnational farming companies at the expense of the health of low-income communities of color (Alkon and Mares, 2012; Pechlaner and Otero, 2010).

Overall, little media coverage exists regarding the dynamics of land conversion in the IE relative to the coverage on health effects, and even less discussion in academic publications about the IE's rapid transition in land use and interrelated proximity and displacement effects resulting from warehouse expansion. The findings of this analysis begin to fill some

of the gaps in understanding regarding local land use changes in relation to warehouse and residential development.

5.1.5 Limitations and Improvements

The results of this study should be considered only as preliminary findings, as my methodology is not yet reliable enough to accurately reflect conversion patterns. Currently, it is likely that current conversion amounts are overestimated, because I considered any overlap between parcels, no matter how small, to be a land conversion. This choice resulted in some parcels being counted as converted when they were merely in close proximity to the warehouse. For instance, one residential land parcel from the year 2017 overlapped very slightly with a warehouse parcel in 2022 using the"Intersect" tool, and thus was counted as converted. However, inspecting Google Earth satellite data demonstrated that the mobile home that was on the residential parcel still existed in 2022. This discrepancy may be due to slight irregularities in county parcel data from year to year which creates small amounts of overlap between parcels that is not reflective of reality, as exact spatial preciseness of parcels from year to year is not a top priority of county Assessor's Offices. Land conversion could be better estimated by implementing a minimum area of overlap that has to be achieved before a parcel can be considered "converted." Preliminarily, I suggest a minimum overlap of 30% of the original parcel area.

By using parcel data from multiple counties as opposed to more conventional methodologies such as rasterized historical satellite data (Chen et al., 2010), there are some inherent limitations in how the data can be interpreted. The Riverside and San Bernardino Counties' Assessor's Offices have different land use classification systems as well as protocol for storing historical shapefile data, which prevents direct comparisons of Riverside and San Bernardino Counties. In particular, the vast majority of agricultural land converted to residential land in Riverside County is "Vacant –Predominate Agricultural Use," which I interpreted as potential agricultural land that was not currently owned by anyone

(Appendix Table 1.3). Definitions of agricultural land were more strict for San Bernardino County and appear to be a better measure of actively used agricultural land. I included Riverside County parcels fitting the "vacant" agricultural land use description in my analysis because I aimed to track the foreclosure of agricultural land in general, not only that which is actively being farmed. This follows the logic that is difficult to convert residential land back to agricultural land than vice versa, and much, much more difficult to convert a large-scale warehouse back into agricultural land. The prevalence of "vacant" agricultural land may account for the relatively high number of acres of residential land built on agricultural land in Riverside County if the agricultural land is effectively vacant. However, this does not explain why agricultural parcels in Riverside County have been increasing–in fact, increasing at an increasing rate–from 2012 to 2022. One possible reason is that the Riverside Assessor's Office has made an effort to improve their record-keeping of "vacant" agricultural land, which may have avoided scrutiny in the past because of its relatively low tax value.

Furthermore, by estimating conversion patterns over five-year time intervals, I assumed that there was no intermediate land use within that five-year time span. While I did not observe any intermediate land uses from satellite imagery, future studies could be made more rigorous by applying my general methodology to parcel data at yearly intervals. Evaluating yearly parcel data would all but eliminate the potential of intermediate land use changes as well as provide a more granular estimate of agricultural and residential conversion rates.

Lastly, the role of warehouse development in accelerating the loss of native vegetation and transitional habitats, as a separate "land use" from residential or agricultural land, should be investigated. Raster data from the U.S Geological Survey's National Land Cover Database could be combined with warehouse parcel data to estimate habitat loss from logistics development (Earth Resources Observation and Science (EROS) Center, 2019). As

a more precise, but data-intensive methodology, satellite data could be rasterized and evaluated to update the land conversion patterns documented in Riverside County by Chen et al. (2010).

5.2 The Future of "Green" Logistics

My analysis indicates that increasing amounts of agricultural and residential land are being displaced by warehouse expansion in Riverside and San Bernardino Counties. Recent moves by regional and state authorities to regulate the logistics industry have focused on pollution mitigation and minimum distance rules. However, these policy interventions fail to address the ways in which the logistics industry exploits whole communities and destroys the land in favor of sustained profits–what many would call "green capitalism." As climate change anxiety puts pressure on companies to implement "sustainable" operations, what would a "green" logistics industry look like for those who are most subject to the whims of development?

In August of 2022, the California Air Resources Board approved Governor Gavin Newsom's executive order to prohibit the sales of gasoline-powered cars beginning in 2035, intended to reduce greenhouse gas emissions and pollution (State of California, 2022). The South Coast Air Quality Management District (SCAQMD)'s proposed "Warehouse Indirect Source Rule," if implemented, would require all existing and future warehouses to reduce emissions through purchasing zero-emission trucks or else paying a $1000 mitigation fee to SCAQMD for each aspect of the facility that contributes to pollution (Levin, 2021; Stroik and Finseth, 2021). The SCAQMD estimates that implementation of their rule would save between 150 and 300 lives and prevent up to 5,800 asthma attacks, 20,000 fewer missed work days, and save up to 2.7 billion dollars in public health benefits between 2022 and 2031 (Stroik and Finseth, 2021).

Neighborhoods in proximity to warehouses would enjoy cleaner air, fewer doctor's visits,

and less noise owing to the absence of diesel trucks driving and idling nearby. However, even if the best-case scenario that all shipment trucks are zero-emission in 2035 is achieved, communities will suffer for a minimum of thirteen years. Can such legislation truly be considered environmental "justice" if it still allows casualties to occur? Furthermore, even if these rules were to be implemented fully and equitably, a near future in which transnational retail companies and logistics firms operating zero-emissions logistics supply chains would further entrench the IE's people and land in an extractive plantation economy by increasing regional dependence on the logistics industry.

If proximity effects relating to noise and pollution are virtually eliminated, the problem of displacement still remains, with low-income renters and communities of color most at risk. Furthermore, air pollution regulation does not address the economic and physical subordination of warehouse workers. This is not to say that air quality legislation is not a crucial component of addressing the environmental injustices that arise from warehouse siting; rather, these policies should not become the extent of solutions that are considered to address local warehouse expansion. Instead, what if those in the Inland Empire most vulnerable to the whims of logistics development were able to prioritize health and stability of their communities?

5.3 Solidarity, Landscape Reclamation, and Hopeful Futures

Beginning in early 2022, some IE cities–including Pomona, Chino, Redlands, Norco, and Colton– have begun passing ordinances to temporarily ban the construction of warehouses to more thoroughly assess their impacts. National media such as the New York Times and The Guardian have published multiple articles on the Inland Empire's logistics industry and its effects on local communities in the past year. Two decades after the logistics industry in Los Angeles and Long Beach faced a wave of condemnation for its impacts on

port-adjacent neighborhoods (Houston et al., 2008), signs point to a growing sense of trepidation among local political leaders and increased national scrutiny about whether warehouse expansion should continue unrestrained in the IE and nationwide. Coupled with the rebirth of workplace unionization efforts across the United States, which notably has included warehouse workers in the Inland Empire, this is a crucial time for IE communities to decide what kind of future they want for themselves and their children.

The dynamics of current land conversion patterns is indicative of how logistics and real estate development companies work in tandem to profit off of poor people of color and exploited Indigenous land. Instead of accepting these extractive and unsustainable land development schemes, I consider alternate regional development strategies that are centered around liberation for Indigenous, Black, Latino, and other people of color, sustainable and just housing initiatives as well as the cultivation of respect for and protection of the land.

5.3.1 Solidarity with Workers

The displacement of vulnerable IE residents from logistics industry expansion is closely linked to the labor exploitation that occurs daily on the warehouse floor, as the logistics workforce is made up especially of poor people of color who are more likely to be impacted by warehouse development. Led by Amazon, warehouse companies are gradually shifting to operating procedures that use robots, instead of human employees, to sort and pack goods (De Lara, 2018; Sainato, 2020), establishing yet another way in which the IE is used as a "testing ground" for new ways to regiment exploited labor (DeLoughrey, 2013). As robotics technology develops, it is foreseeable that warehouse employment opportunities will not keep up with warehouse expansion. Workers and concerned IE residents have been aware of connections between precarious labor and environmental health for a long time: In 2019, Amazon warehouse workers and environmental justice activists joined forces to protest for not only better pay for workers, but also pollution mitigation (Katzanek, 2019). Community pressure is one way in which municipal governments begin to change their

development strategies. In one local media interview in September of 2022, Colton's city planner stated what community activists have said for years: that warehouses fail to offer adequate jobs and wages to justify their local expansion (Guilhem, 2022). The expansion of solidarity actions between households impacted by warehouse expansion and logistics sector employees is essential to broadening understandings of the logistics industry as an ultimately extractive fixture in the Inland Empire.

5.3.2 Housing Justice

Inland Empire residents working in blue-collar warehouse positions are especially vulnerable to rising housing costs as the IE's reputation as an affordable place to live in Southern California falters. The Housing Crisis Act of 2019 is a tangible example of how top-down legislation can respond to housing unaffordability. The bill codifies housing densification as a necessary measure to increase housing stock and requires that low-income households displaced by logistics and dense housing developments be provided with housing transition assistance (State of California, 2019). Densification also prevents further urban sprawl, which increases worker commute times as well as accelerates the development of vulnerable habitat (FOX 11 Los Angeles, 2021). A future IE and national housing strategy must prohibit rent gouging and urban sprawl designed to maximize profits for landlords and real estate developers, particularly as logistics industry developers begin to compete with residential development due to shortages in local industrial leases (Rogers, 2022).

5.3.3 Reclaiming the Land

Development plans for the IE that recognize the intrinsic value of green spaces and "undeveloped" land have the potential to promote public and environmental health and Native sovereignty. Urban green spaces such as parks and backyards, which are at risk from continued land development, provide psychological health benefits, reduce urban heat island effects, and protect biodiversity, among other benefits (Jennings and Bamkole, 2019;

Rudd et al., 2002; Zhang et al., 2017) (See Chapter 3 Section 3.2.2). However, even underutilized or "abandoned" land has the potential to be reclaimed. By expanding conceptions of ideal land uses beyond additional logistics development, municipal governments can prioritize the needs of the community over the profits of out-of-state retail corporations. Vacant land could be made into affordable housing, healthcare infrastructure, or a park or community garden, when possible. Thinking further into the future, some warehouses may become abandoned, creating the opportunity to exercise collaborative design principles that reflect the needs of the community. Loures and Panagopoulos (2007) argue that landscape reclamation is most successful when it allows resources for long-term landscape maintenance, applies collaborative design principles, and enhances biodiversity, social stability and economic development" (Loures and Panagopoulos, 2007). For instance, the non-profit organization Huerta del Valle's predominantly Latine community members are both the growers and recipients of the fresh produce grown on its urban garden plots across the Inland Empire. Community cohesion and the regenerative usage of urban space is vital to Huerta del Valle's mission. If given the chance, urban agriculture could be expanded to provide significant health benefits to the IE's most vulnerable community members.

Furthermore, characterizations of the IE's landscape as a lifeless desert fail to consider how inland Southern California's diverse forest, scrubland, and desert habitats provide a variety of ecosystem services, such as sequestering carbon, regulating the climate, and protecting groundwater sources (Underwood et al., 2019). Development in Southern California over the region's 300-year colonial history has greatly reduced the original extent of native habitats (Minnich and Dezzani, 1998; Riordan et al., 2015). However, the ecosystem services framework, which positions the land as a collection of resources (to be exploited), is inadequate to expressing the inseparability of land with Indigenous people (Sepulveda, 2018). Ensuring that local Indigenous people have as much sovereignty over their lands and in particular, over native habitats–in addition to access to affordable housing within their

homelands– is not only a necessary step to counter long histories of land dispossession and racial exclusion, but also promotes biodiversity and environmental health through Indigenous land stewardship. Particularly for groups such as the Tongva who were denied federal reservation land on which to live, the preservation of native habitat is crucial for local Indigenous people to exercise sovereignty through harvesting and ceremony (Gabrielino-Tongva Indian Tribe, 2022). "Land back" campaigns are gaining traction in Southern California; land in Los Angeles County was returned to Indigenous stewardship for the first time since colonization began in the spring of 2022 (The Tongva Taraxat Paxaavxa Conservancy, 2022). There is ample room for Indigenous land stewardship in the Inland Empire to be implemented.

5.4 Conclusion

My analysis preliminarily suggests that warehouse development projects have directly or indirectly displaced thousands of people over the past ten years by converting thousands of acres of residential and agricultural land in the Inland Empire. Households in communities who have been targeted for warehouse developments are faced with two choices: to live in close proximity to the noise and pollution of the warehouse's trucks, thus increasing the risk of asthma, cancer, and premature death as well as reducing the safety and social cohesiveness of the neighborhood; or, to leave. Sometimes, leaving one's home is a decision made not only to avoid warehouse encroachment, but also to seek job opportunities and a better quality of life elsewhere. Patterns of residential displacement and land conversion are intimately caught up with the exploitation of warehouse workers. By recognizing that warehouse expansion is a means by which land exploits land and people, we might understand that the domination of the logistics industry in the Inland Empire is a plantation economy that has no easy way out. "Green development" via zero emissions trucks does not begin to solve problems of displacement or labor exploitation. In

speculating what a future Inland Empire might become, I turn to an inquiry from McKittrick (McKittrick, 2013):

> What if we acknowledged that the plantation is, as Toni Morrison writes, a space that everybody runs from but nobody stops talking about, and thus that it is a persistent but ugly blueprint of our present spatial organization that holds in it a new future?

The Spanish Mission Period began the ongoing process of land dispossession and labor exploitation of Indigenous people in the region. In the twenty-first century, the logistics industry continues this process through displacing agricultural and residential land, exposing disproportionately low-income Black and Latine communities living near warehouses to air pollution, and denying living wages to warehouse workers, who are also predominantly poor people of color. It would be easy, using the results I have provided, to suggest that agricultural land will eventually disappear and that warehouses will proliferate without end, displacing thousands of vulnerable families and subjecting perhaps hundreds of thousands to dangerous levels of air and noise pollution. However, borrowing from McKittrick's reading of Dionne Brand's "Inventory", I see this work as necessary to disrupt the narratives of "linear progress toward unending death" that have become worryingly common in today's world. Above all, this work refuses to accept the implied forever-ness of the settler-colonial project on this land. Two hundred and fifty years ago–a mere five generations ago–European colonizers first set foot here. In 2022, Tongva people finally regained land to call their own; I am holding my breath for what comes next. I hope that this research becomes a useful contribution to community organizers who have worked tirelessly for decades to make the dire effects of logistic industry expansion known.

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Appendix

Table 1.1: Derivation of urban and rural residential displacement estimates

	City	population per square mile (2010)	population per square mile (2020)
Urban	Riverside	3745.0	3887.8
	San Bernardino	3546.0	3574.7
	Moreno Valley	3771.2	4064.8
	Fontana	4620.8	4838.4
	Ontario	3282.4	3507.3
	average	**3793.1**	**3974.6**
Rural	Beaumont	1193.0	1749.4
	Victorville	1583.9	1828.9
	Cathedral City	2381.5	2289.2
	Perris	2178.4	2495.7
	Barstow	547.0	615.4
	average	**1576.8**	**1795.7**

Table 1.2: Original file formats for each year of parcel data. For Riverside County, land use data (comma-separated-values format) was joined to spatial data (shapefile format) by indexing to the "GeoCd" and "APN" fields, respectively, for each file.

Year	Riverside County	San Bernardino County
2007	csv; bare shapefile	unavailable
2010	csv; bare shapefile	detailed shapefile
2012	csv; bare shapefile	detailed shapefile
2017	csv; bare shapefile	detailed shapefile
2022	detailed shapefile	detailed shapefile

Table 1.3: Unique land use descriptions for converted land parcels in Riverside County, 2012 - 2017

Years	**Residential to Warehouse**	**Agricultural to Warehouse**	**Agricultural to Residential**
2012 - 2017	MH (LPT) on Leased Land (ML) (1) Single Family Dwelling (1)	Vacant Land - Predominate Agricultural Use (5) AP-Vacant Land - Predominate Agricultural Use (1) Irrigated Farmland (1)	Vacant Land - Predominate Agricultural Use (1142) Agricultural Land - Transitional (172) Agricultural Land with SFR (170) Agricultural Land with Misc Imps (152) Avocado Grove (82) Irrigated Farmland (25) Non-Irrigated Farmland (12) Citrus Grove (5) Agricultural Land - Mountain (4) Horse Ranch (3) Citrus Grove with SFR (2) Date Garden (2) Irrigated Farmland with SFR (2) Agricultural Land - Desert (1) Agricultural Land with MH on Foundation (1) Agricultural Land with MH on LPT (MO) (1) AP-Agricultural Land with Misc Imps (1) AP-Agricultural Land with SFR (1) AP-Citrus Grove with SFR (1) Date Garden with SFR (1) Greenhouse/Nursery with SFR (1) Horse Ranch with SFR (1) MH on Leased Agricultural Land (ML) (1) Other Livestock with SFR (1) PI-CT-Irrigated Farmland (1) Wine Grape Vineyard with SFR (1)

Table 1.4: Unique land use descriptions for converted land parcels in Riverside County, 2012 - 2017. * indicates parcels that overlapped between residential and agricultural land conversion categories (n = 3)

Years	Residential to Warehouse	Agricultural to Warehouse	Agricultural to Residential	Agricultural to Residential cont.
2017 - 2022	Single Family Dwelling (176)	Vacant Land - Predominate Agricultural Use (18)	Vacant Land - Predominate Agricultural Use (5056)	AP-Date Garden with SFR (16)
	Residential Use Zoned Commercial (36)	Irrigated Farmland (9)	Agricultural Land - Transitional (3042)	Poultry Ranch with SFR (16)
	MH Lot with MH on LPT (MO) (27)	AP-Vacant Land - Predominate Agricultural Use (4)	Irrigated Farmland (547)	AP-Vacant Land-Predominate Agricultural Use (15)
	MH on Foundation (MF) (14)	Date Garden (4)	Non-Irrigated Farmland (373)	Poultry Ranch (15)
	MH (LPT) on Leased Land (ML) (11)	Agricultural Land - Desert (3)	Agricultural Land - Desert (340)	Wine Grape Vineyard with SFR (13)
	MH Lot with MH on ILT (MR) (11)	Agricultural Land with SFR (2)*	Agricultural Land with SFR (157)	AP-Avocado Grove with SFR (12)
	Apartment Over 100 Units (6)	AP-Greenhouse/Nursery (2)	Agricultural Land - Mountain (102)	AP-Avocado Grove (10)
	MH (LPT) in a Rental Park (MP) (6)	Agricultural Land - Mountain (1)	Date Garden (101)	AP-Citrus Grove (9)
	Fourplex (4)	Agricultural Land with Misc Imps (1)	Citrus Grove (99)	Other Livestock (9)
	Apartment 5 - 10 Units (3)	AP-Irrigated Farmland (1)	Agricultural Land with Misc Imps (79)	Avocado Grove with SFR (7)
	Agricultural Land with SFR (2)*	Greenhouse/Nursery (1)	Horse Ranch with SFR (71)	Table Grape Vineyard (5)
	Apartment 61 - 100 Units (2)	Non-Irrigated Farmland (1)	Horse Ranch (69)	AP-Date Garden (4)
	Manufactured Home Park (2)	PI-Agricultural Land with Misc Imps (1)	Agricultural Land with MH on Foundation (49)	Agricultural Well Site (3)
	Apartment 11 - 20 Units (1)	Poultry Ranch with SFR (1)*	Agricultural Land with MH on LPT (MO) (42)	AP-Non-Irrigated Farmland (3)
	Apartment 41 - 60 Units (1)		Agricultural Land with MH on ILT (MR) (40)	Date Garden with SFR (3)
	Duplex (1)		Agricultural Land with MH (36)	AP-Citrus Grove with SFR (2)
	Poultry Ranch with SFR (1)*		Irrigated Farmland with SFR (33)	AP-Irrigated Farmland with SFR (2)
	Triplex (1)		AP-Agricultural Land with SFR (29)	MH on Leased Agricultural Land (ML) (2)
			Greenhouse/Nursery with SFR (27)	PI-Agricultural Land with Misc Imps (2)
			Avocado Grove (26)	PI-Vacant Land - Predominate Agricultural Use (2)
			AP-Irrigated Farmland (23)	AP-Horse Ranch with SFR (1)
			Greenhouse/Nursery (22)	CT-Citrus Grove with SFR (1)
			Other Livestock with SFR (20)	Dairy Farm with SFR (1)
			Citrus Grove with SFR (18)	Fish Farm (1)
			Wine Grape Vineyard (18)	Non-Irrigated Farmland with SFR (1)
			Dairy Farm (17)	PI-Irrigated Farmland (1)

Table 1.5: Unique land use descriptions for converted land parcels in San Bernardino County, 2017 - 2022

Years	**Residential to Warehouse**	**Agricultural to Warehouse**	**Agricultural to Residential**
2012-2017	SFR (72) Two SFR (6) Residence on Commercial (5) Misc Residential Structure (4) Three SFR (4) MH on fee land, not in MH subdivision (2) Triplex (2) Quad (2) Manufactured Home Park (2) Apartment, 5-14 units (1)	Citrus (7) Row Crops (6) Livestock (6) Dairy (5) Misc. Agricultural Building (4)	Dairy (327) Citrus (175) Barn (67) Misc. Agricultural Building (42) Field Crops (22) Grazing (9) Poultry (9) Livestock (3) Greenhouse (3) Row Crops (2) Alfalfa (1) Vines (1) Deciduous (1) SFR / Agricultural (1) Multi Family Residential / Agricultural (1)
2017 - 2022	SFR (111) Residence on Commercial (72) Two SFR (15) Three SFR (3) Four SFR (1)	Dairy (34) Field Crops (12) Vines (4) Livestock (4) Citrus (2) Poultry (1) Poultry House (1) Greenhouse (1) Industrial/Agricultural (1)	Dairy (982) Citrus (638) Valencias (51) Poultry (33) Field Crops (32) Row Crops (11) Grazing (5) SFR / Agricultural (5) Barn (4) Deciduous (3) Misc. Agricultural Building (3) Vines (2) Navels (2) Bees, Worms, etc. (2) Greenhouse (2) Livestock (1)

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