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Publication Date

2023-04-01

Undergraduate

Redlining the Sky:

Air pollution and the Legacy of Redlining in West Oakland

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COLWRIT R4B: Stories of Sustainability

Course number: 30418

Section number: 24137

Professor Kim Freeman

Completed May 10, 2022

Abstract

Environmental justice refers to a growing body of research concerned with the intersection of environmental issues and social inequality. This essay draws on concepts of environmental justice to understand how environmental pollution is differentially distributed across populations according to race, income, and geographic location. Looking specifically at West Oakland, California, it asks whether the disproportionate level of environmental pollution faced by residents of color is a result of historically racist government policies. By analyzing health data, socioeconomic data, and historical housing policies, it finds that there is a strong connection between present-day health disparities and redlining practices that began in the 1930's. West Oakland contains the highest levels of air pollution in the Bay Area and consequently contains some of the highest rates of pollution-associated health outcomes. In addition, it uses demographic data to show that this pollution burden is falling largely onto historically marginalized racial and ethnic groups. It applies various definitions of Environmental Justice and Environmental Racism to position the essay within a critical framework that analyzes the implications of institutionalized racism combined with environmentally destructive industrial practices.

Redlining the Sky:

Air pollution and the Legacy of Redlining in West Oakland

Introduction

Modern humans have developed methods of extraction and production that have become increasingly harmful to the environment. So far have we continued to employ those methods while expanding our civilizations and continuously growing our industries that they now form the basis of all the largest contemporary civilizations. Globalization reflects a history of violence, power struggles, and domination of certain groups over others. Looking specifically at the United States, a history of colonialism, slavery, and genocide enabled the establishment and rapid development of one of the worlds most ‘powerful’ countries. The economic model underlying this history both prescribed and co-evolved with the exploitation and subjugation that marks our past and lives actively in our present. These practices have become so harmful that they are not only threatening the stability of the entire biosphere— they are threatening the fate of humanity— both in the future, and in the present moment. History has shown that the subjugation of both humans and the environment not only go hand-in-hand, but are crucial to the functioning of the dominant economic model. This subjugation has created a world in which multiple layers of oppression intersect with unsustainable methods of production to produce socially and environmentally differentiated landscapes in which the environment and human health are simultaneously degraded.

The methods of production on which we rely for the security of our modern livelihoods have both destroyed the environment and created deep fissures of inequality throughout society. Across much of the world, we can see that environmental pollution and historically marginalized groups often coincide geographically. The intersection of racism and environmentally destructive

production spawns environments characterized by inequality across multiple fronts.

Environmental racism – borne from the marriage of a capitalist model of destruction and institutional racism– describes situations in which the harmful externalities of industry fall disproportionately onto communities of color. As a result, modern-day cities across the United States are plagued by increasing economic and environmental inequality. Places like Cancer Alley in New Orleans or Flint, Michigan are two well-known examples of the extremely harmful and often lethal nature of environmental racism.

For the purpose of this paper, I will be examining the intricacies of environmental injustice in a specific region of the Bay Area: West Oakland, California. In West Oakland, a history of racialized institutional actions waged against marginalized groups and waged in favor of white proliferation and economic prosperity has generated a severe case of environmental injustice. Dr. Mascarenhas, Associate Professor in Environmental Science, Policy, and Management from the University of California, Berkeley, defines environmental injustice as “a situation in which a specific group is disproportionately affected by environmental conditions brought on by unequal laws, regulations, and policies”, and that “Environmental Racism argues that this sort of discrimination targets people of color, or targets race”.¹ In “Environmental Racism”, Environmental Justice scholar and American Geographer Laura Pulido defines Environmental Racism as the “socially uneven distribution of pollution and environmental resources along racial lines”.² This paper draws on both definitions of environmental racism in order to analyze the case of West Oakland.

¹ Michael Mascarenhas, “A Lesson in Environmental Justice.” ESPM 168: Political Ecology (guest lecture, University of California, Berkeley, Berkeley, CA, April 28, 2022).

² Pulido, Laura. “Environmental Racism.” *International Encyclopedia of Geography: People, the Earth, Environment and Technology*, 2017, 1–13.
<https://doi.org/10.1002/9781118786352.wbieg0453>.

A history of racist and exploitative institutional actions has led to the present-day experience of environmental racism in West Oakland, causing largely low-income people of color to experience a disproportionate burden of environmental pollutants. Due to air pollution generated by industrial and commercial activities, the residents of West Oakland face adverse health effects including a higher mortality rate, higher incidence of asthma, increased risk of cancer, cardiovascular disease, birth defects, and lower life expectancy.³ Young children across West Oakland are suffering from alarming rates of asthma compared to the larger Alameda county region. The demographic composition of West Oakland is non-coincidentally majority low-income people of color. West Oakland itself is bordered by the Port of Oakland and geographically cut out by three major highways that serve as connective vessels of transportation for the entire Bay Area. The co-development and implementation of racialized housing policies with environmentally destructive economic expansion has produced the current public health crisis in West Oakland. The disproportionate level of air pollution experienced by the people of West Oakland can be directly attributed to historically racist housing policies enacted by both federal and local governments. This is a case of environmental racism, constituted by the fact that specific racial groups experience higher environmental burdens than other groups.⁴

Drawing upon multiple scientific sources and community-driven participatory research, this project hopes to highlight the connection between historically racist housing policies and the disproportionate environmental burden and health outcomes experienced by the residents of West Oakland, California. It traces the geographical, social, and economic connection between historic redlining and present-day air pollution by developing this argument across 4 sections: Identifying

³ California Environmental Protection Agency. "Oakland Initiative Report." Environmental Justice Task Force Report, 2018, 1-28.

⁴ Pulido, "Environmental Racism".

the Issue, People & Place, Historical Background, and Formalizing the Connection. The first section details the adverse health effects experienced by residents of West Oakland in comparison to the greater Bay Area. The second section looks into the demographics and geographical characteristics of West Oakland. ‘Historical Background’ does an in-depth examination of historical housing policies and redlining practices in Oakland dating back to the early 20th century. The fourth section, ‘Formalizing the Connection’, analyzes the relationship between sections one, two, and three, solidifying the connection between redlining and present-day health outcomes. The conclusion offers a synopsis of the findings of this paper as well as their implications in relation to broader trends of environmental injustice throughout the nation.

I. Identifying the Issue:

Environmental racism posits that historically marginalized groups experience disproportionate levels of environmental pollution.⁵ In West Oakland, one way that environmental racism is manifesting is through the air. West Oakland has some of the highest levels of air pollution in the Bay Area.⁶ This pollution is largely attributed to activity related to the Port of Oakland, which sits directly adjacent to West Oakland. Due to industrial and commercial activity, West Oakland residents face disproportionate levels of diesel exhaust and other traffic-related air pollutants. The three main air contaminants from port-associated activities causing adverse health effects are Diesel PM (diesel PM), Fine Particulate Matter (PM_{2.5}), and Toxic Air Contaminants (TACs).⁷ Fine Particulate Matter (PM_{2.5}) is a mixture of

⁵ Pulido, “Environmental Racism”.

⁶ Bay Area Air Quality Management District. “Owning Our Air: The West Oakland Community Action Plan.” 2019.

<https://www.baaqmd.gov/community-health/community-health-protection-program/west-oakland-community-action-plan>.

⁷ Ibid.

solid particles and liquid droplets that are less than 2.5 micrometers in diameter, while diesel PM is a type of particulate matter that comes specifically from diesel emissions, but is usually within the same size range as PM_{2.5}. Exposure to either of these chemicals can lead to premature mortality, cardiovascular disease, and respiratory illnesses including asthma and bronchitis. Diesel PM specifically has been classified as a toxic air contaminant that is known to cause cancer.⁸

The main source of these pollutants are large trucks that transport containers to and from the Port of Oakland thousands of times per day. The West Oakland Environmental Indicators Project (WOEIP) found that approximately 6,300 truck trips occur daily in West Oakland, emitting massive amounts of diesel PM.⁹ Air pollution seems to be intangible and difficult to visualize due to its gaseous and transparent nature. However, some of the toxic byproducts of port-related activities can be seen in their physical form, even before they manifest as illness in the human body: West Oakland residents have grown accustomed to dusting toxic soot off their window sills on a daily basis. The amount of toxic soot produced in one day by trucks that frequent the area is equal to what would be produced by 127,677 cars, enough cars to cover all the streets in West Oakland four cars wide and two cars deep.¹⁰

The activity of trucks, rail, cars, and boats coming to and from the Port of Oakland combined with high traffic on surrounding freeways causes West Oakland to have drastically

⁸ Ibid.

⁹ Gonzalez, Priscilla A. et al. "Community-Based Participatory Research and Policy Advocacy to Reduce Diesel Exposure in West Oakland, California." *American Journal of Public Health* 101, no. S1 (2011). <https://doi.org/10.2105/ajph.2010.196204>.

¹⁰ Palaniappan M, Wu D, Kohleriter J. *Clearing the Air: Reducing Diesel Pollution in West Oakland*. Oakland, CA: Pacific Institute; 2003. <https://www.environmental-expert.com/articles/clearing-the-air-reducing-diesel-pollution-in-west-oakland-3024>.

different levels of air pollution than the greater Bay Area, and even the entire state of California. On the municipal level, studies show that West Oakland residents are exposed to approximately five times more diesel PM than any other area of Oakland.¹¹ In comparison to the greater Bay Area, West Oakland experiences 9X more diesel PM per year than nearby cities and 3X more diesel concentration than the San Francisco Bay area as a whole.¹² On a larger scale, one study estimated that West Oakland has approximately 90 times more diesel PM per square mile per year than the average for the state of California as a whole.¹³ These numbers indicate a disproportionate amount of air pollution concentrated in West Oakland on local, regional, *and* state levels.

The result of such high levels of air pollution is that residents in West Oakland also experience disproportionate rates of pollution-related illnesses. Multiple studies suggest that inhaling air pollutants has adverse health effects including premature death, cardiovascular disease, cancer, asthma, and a plethora of other respiratory-related illnesses.¹⁴ Due to their disproportionately high exposure to local air pollutants, West Oakland residents face higher rates of asthma, cardiovascular disease, premature death, and other health issues as compared to other urban regions in the Bay Area. The leading causes of death in West Oakland are cancer, heart disease, stroke, and chronic lower respiratory disease, which are all associated with air pollution.¹⁵

¹¹ Ibid.

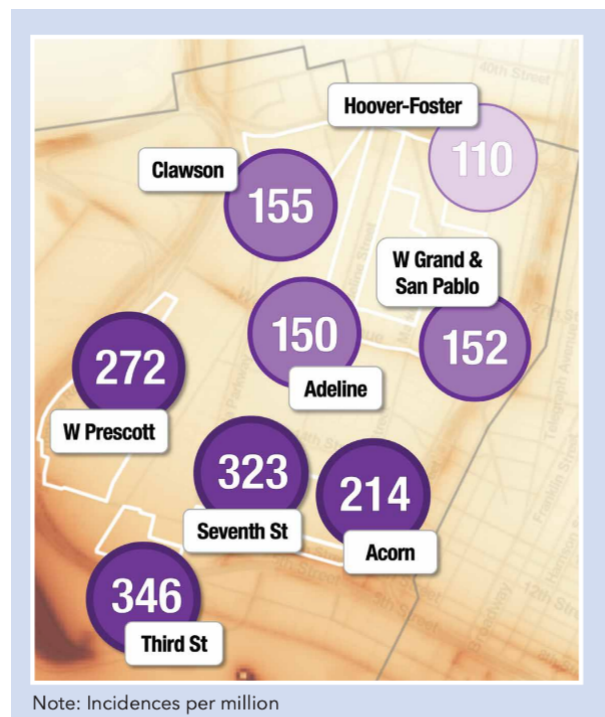
¹² Varela, Alondra. "Asthma-Related Hospitalization and Emergency Room Visits in Oakland." *McNair Research Journal SJSU* 13 (2017). <https://doi.org/10.31979/mrj.2017.1312>.

¹³ Gonzalez et al, "Community-Based Participatory Research".

¹⁴ CalEPA, "Oakland Initiative Report".

¹⁵ Davis, Muntu. "Air Pollution Risk & Vulnerability to Health Impacts: A Look at West Oakland." California Air Resources Board. Alameda County Public Health Department, March 26, 2018.

As previously stated, $PM_{2.5}$ and diesel PM, the two main contaminants from industrial and commercial activity of the port, are known to cause asthma and cancer. In West Oakland, residents have a 5X higher cancer risk than other parts of Oakland from their exposure to diesel PM.¹⁶ The West Oakland Community Action Plan “Owning Our Air” by WOEIP found that over 90% of this increased cancer risk comes from local diesel PM pollution. It also found that neighborhoods within West Oakland that are closer to 7th street and the Port of Oakland exhibit increased cancer risk for residents. *Figure 1* shows a direct correlation between cancer risk and proximity to the Port of Oakland, as numbers of additional cancer risk per 1 million increase as distance from the Port and 7th street decreases.¹⁷



Additionally, rates of asthma in West

Oakland are much higher than other regions of the Bay area. One of the most imminent threats to the livelihood of children currently residing in West Oakland is risk of asthma from diesel PM emissions. As of 2015, the rate of asthma for children in Oakland was 18.6%, compared to https://ww2.arb.ca.gov/sites/default/files/2020-05/capp_consultation_group_march_2018_alameda_county_health_presentation_acc.pdf.

¹⁶ Palaniappan et al, “Clearing the Air”.

¹⁷ Bay Area Air Quality Management District. “Owning Our Air”.

California's average childhood asthma of 7.1%.¹⁸ Children in West Oakland are *seven times* more likely to be hospitalized for asthma than the average child in the state of California.¹⁹

Additionally, up to 50% of asthma cases were attributable to traffic-related air pollution, compared to 25% for the Oakland hills, a predominantly white area.²⁰ African American and Latino Children were also more likely to be hospitalized for asthma than non-hispanic whites, and they make up 60% of the hospitalization rates for Alameda county.²¹

As can be seen from the higher levels of air pollution and associated health effects in comparison to other regions of the Bay Area and California, the residents of West Oakland experience a disproportionate environmental burden. It is no coincidence that in the area containing the highest levels of diesel PM in Oakland, people are experiencing higher incidences of pollution-related illness and death. The next section examines the characteristics of the people living in this high-pollution zone, in order to draw a correlation between environmental burden and other socioeconomic factors, showing that the people experiencing the adverse effects of pollution are historically marginalized groups. It will be shown that low income and people of color are taking the brunt of the pollution produced by the Port of Oakland, constituting environmental racism by both Pulido and Mascarenhas' definitions.

II. People & Place:

In order to understand the case of environmental injustice in West Oakland, we must understand the socioeconomic characteristics of the population and the geographic design of its

¹⁸ Varela, "Asthma-Related Hospitalization and Emergency Room Visits in Oakland", 107.

¹⁹ Palaniappan et al. "Clearing the Air".

²⁰ Environmental Defense Fund. "Air Pollution's Unequal Impacts in the Bay Area." Accessed May 11, 2022. <https://www.edf.org/airqualitymaps/oakland/health-disparities>.

²¹ Varela, "Asthma-Related Hospitalization and Emergency Room Visits in Oakland", 108.

environment. West Oakland is home to predominantly low-income people of color. Physically, it is a small rounded rectangular region that sits on the westmost end of Oakland and is geographically cut out by various high-speed, high-traffic freeways. West Oakland is directly next to the Port of Oakland, and is bordered on all sides by freeways, as can be seen in the image below, taken from a screenshot of google maps.²²

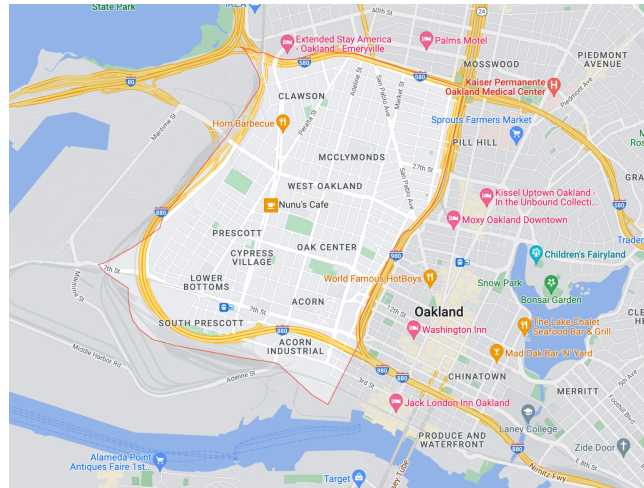


Figure 2. Google Maps. “West Oakland, California.” Accessed May 1, 2022. <https://tinyurl.com/WestOaklandCA>.

The majority of pollution in the area comes from industrial and commercial activities. The Port of Oakland is the third largest port on the West Coast, and the fourth busiest maritime port in the United States. Industrial and commercial activities that are reliant on fossil-fuel technology and infrastructure produce mass amounts of air pollution. The main sources of pollution come from activities associated with the port, including emissions generated from transportation vehicles such as large trucks, cargo ships, and rail activity.

If we look at the demographics of West Oakland, we can see that the environmental pollutants generated by the nearby industrial and commercial activity disproportionately affect people of color. West Oakland is composed of 91% racial and ethnic minorities and only 9%

²² “West Oakland, California,” Google Maps, Accessed May 1, 2022, <https://tinyurl.com/WestOaklandCA>.

white. The majority of West Oakland is African American (65%), with the remainder being Hispanic (7%), White (9%), Asian (9%) and ‘other’ (10%).²³ Through this data, we can see that the disproportionate environmental pollution in West Oakland is falling onto a population that is majority people of color.

In addition to hosting a high population of historically marginalized ethnic groups, West Oakland hosts a population that is economically disadvantaged compared to the city of Oakland and Alameda county. The median household income from 2010-2014 for West Oakland was \$39,601, compared to \$52,962 for all of Oakland.²⁴ From 2010-2015, the population of West Oakland living below the poverty line was 28.6%, compared to 12.9% for Alameda County as a whole.²⁵ The higher prevalence of poverty in West Oakland often translates to reduced access to healthcare and other social service resources that would help these residents address and combat the environmental health challenges that they face. The disproportionate level of air pollution in West Oakland falls onto residents that also experience higher levels of poverty in comparison to the region they are in.

This data exemplifies how socioeconomic and environmental pollution trends often run parallel to each other. In his guest lecture on Environmental Justice for Political Ecology at the University of California, Berkeley, Dr. Michael Mascarenhas claims that if we analyze environmental pollution “geographically, in terms of gender, ethnicity, age, and employment [...], in every category you will find evidence to suggest that pollution and toxic waste in this country is not distributed evenly. Where you live, your gender, your race, your income, your employment

²³ Fisher, Joshua B., Maggi Kelly, and Jeff Romm. “Scales of Environmental Justice: Combining GIS and Spatial Analysis for Air Toxics in West Oakland, California.” *Health & Place* 12, no. 4 (2006): 701–14. <https://doi.org/10.1016/j.healthplace.2005.09.005>.

²⁴ CalEPA, “Oakland Initiative Report”.

²⁵ Varela, “Asthma-Related Hospitalization and Emergency Room Visits in Oakland”, 110.

status, your age, they all matter in your exposure”²⁶. Applying this testimony to the demographic trends presented in this section, we can see that the environmental pollution of the East Bay is unevenly placed onto a region that has higher rates of poverty and a higher population of people of color, creating a situation of environmental injustice.

III. Historical Background:

Now that it has been clearly established that West Oakland is a site of environmental racism and injustice due to the disproportionate burden of environmental pollutants on people of color, we may look into the origins of this problem. Environmental racism in West Oakland is a result of decades-old institutional actions that were designed specifically to limit people of color and low-income groups to that region. This section shows how a history of capitalist development bound to racist housing policies created a situation in which marginalized groups and destructive industries became confined to the same area.

Beginning in the 1930’s in response to the Great Depression, President Franklin D. Roosevelt created the New Deal to restore economic security in the United States. Embedded within the New Deal policy was the creation of two new federal institutions designed to create housing opportunities, the Federal Housing Association (FHA) and the Home Owners Loan Corporation (HOLC). HOLC was created in order to re-stabilize the nation's mortgage lending system by giving government supported, low-cost loans to Americans in order to purchase new homes. The FHA was created in order to support the purchase of these new homes by being the insurer of new bank mortgages. Together, these institutions enacted a series of racist housing

²⁶ Mascarenhas, “A Lesson in Environmental Justice”.

policies. Between 1934-1962, the Federal Government provided \$120 billion in home loans through HOLC and the FHA, 98% of which went to white people exclusively.²⁷

In addition to racist sentiments that permeated and were deeply ingrained in American society at the time, the disproportionate distribution of these loans can be attributed to the way that the federal government appraised property and determined people's eligibility for loans. In the 1930's, HOLC created "Residential Security Maps" of cities that graded specific neighborhoods on a scale of desirability to determine if they were "secure" to invest in. These maps, also known today as Redlining maps, were color-coded from green to red based on a scale of desirability ranging from A, being 'best', to D, being 'highest risk' or 'hazardous'. In addition to a number of financial determinants, a prime factor in the grading of neighborhoods, as described in the HOLC manual itself, was race. The FHA manual explicitly stated that "inharmonious" racial groups were a key characteristic of regions graded as D, or "highest risk". Under the same category, they also listed "business and industrial uses" as factors that contributed to a lower HOLC grade.²⁸ Through the use of explicitly racist language, they categorized racial minorities and environmentally-destructive activities within the same group of "adverse influences" that corresponded with a lower HOLC risk grade. **Figure 3** below shows an image of the original FHA underwriting manual itself.

the locations within it from adverse influences. Usually the protection against adverse influences afforded by these means include prevention of the infiltration of business and industrial uses, lower-class occupancy, and inharmonious racial groups. A location close

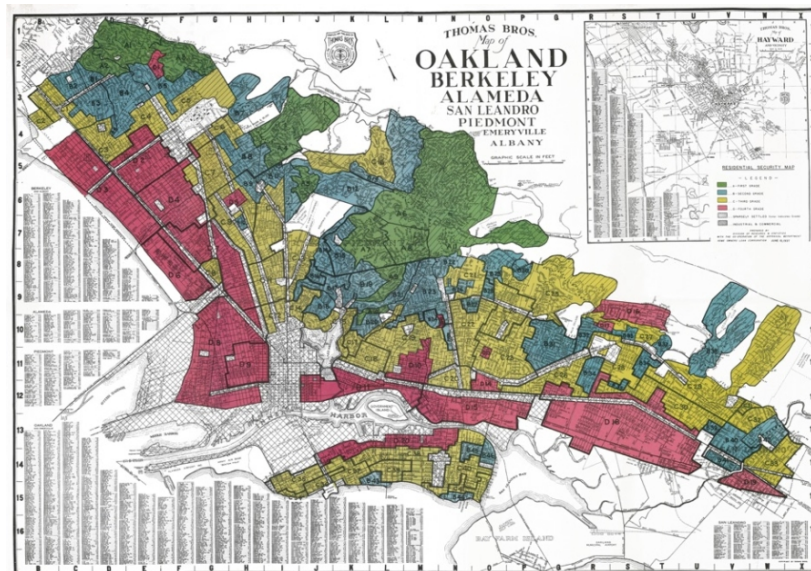
²⁷ CalEPA. "Pollution and Prejudice." ArcGIS StoryMaps. Esri, August 17, 2021. <https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5>.

²⁸ Ibid.

Figure 3. CalEPA. "Pollution and Prejudice." ArcGIS StoryMaps. Esri, August 17, 2021.

<https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5>.

These practices essentially grouped and segregated people of color and low-income groups to regions that were a) historically impoverished, and b) had a high presence of industrial and business activity. This system created a loop that restricted low-income people of color to a specific region while simultaneously entrapping them through institutional, economic, and social barriers that only further exacerbated the racial wealth gap and prolonged it for future generations. It also grouped people of color and environmentally destructive activities within the same category of "undesirable", geographically designating them to the same areas. If we look at how this played out in Oakland specifically, we can see that the areas graded D on HOLC redlining maps are also the same areas that host the most people of color, and the most environmental pollution. *Figure 4* below shows the redlining map for Alameda County that was created and used by HOLC in the 1930's, with green representing areas graded 'A', blue referring to areas graded 'B', yellow as areas graded 'C', and red representing areas graded 'D'.²⁹



²⁹ CalEPA, "Pollution and Prejudice".

Figure 4. CalEPA. "Pollution and Prejudice." ArcGIS StoryMaps. Esri, August 17, 2021.

<https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5>.

Redlining essentially limited housing opportunities for POC and low-income groups to specific neighborhoods that non-coincidentally had the highest level of industrial and commercial activity. It can be seen from this image that West Oakland is located within the area ranked 'D' or 'high-risk' by HOLC residential security maps, resulting in a high concentration of minority ethnic groups residing there coupled with high levels of environmental pollution. This indicates that the concentration of minority racial and ethnic groups in West Oakland can be traced back to discriminatory property policies implemented by the government in the 1930's and enforced by local officials.

The use of explicitly racist language in the HOLC and FHA manuals indicates the government's deliberate designation of minority racial groups to geographically specific sites of high industrial activity and associated environmental pollution. Using Dr. Mascarenhas' definition of Environmental Racism discussed in the introduction of this paper as environmental pollution that specifically targets race, as well as Laura Pulido's definition which defines it as "any policy, practice, or directive that differentially affects or disadvantages [...] individuals, groups, or communities based on race or color", we can conclude that the intentional actions of the government to geographically and economically segregate people of color in environmentally hazardous areas constitutes environmental racism.³⁰

IV. Formalizing the Connection:

It is now evident that West Oakland is a site of environmental racism. Through the data provided in this paper, we can see that West Oakland has significantly higher levels of air

³⁰ Mascarenhas, "A Lesson in Environmental Justice"; Pulido, "Environmental Racism".

pollution and associated health outcomes in comparison to the greater Bay Area. Additionally, West Oakland has higher low-income and minority populations, and it is an area that was historically redlined. My claim here is that racist property laws administered by the U.S. government in the 1930's is a direct cause of the high incidents of pollution-related illness that occur in West Oakland today. With the ample evidence provided in this paper, we can see that West Oakland has drastically disproportionate levels of environmental pollution in comparison to other areas of Oakland. This area also has some of the highest population of people of color in all of Oakland. Historically racist housing policies geographically segregated the city of Oakland, concentrating people of color in areas containing higher environmental pollution.

The disproportionate effect of air pollution on minority racial groups in West Oakland is a case of environmental racism that can be traced back to racist U.S. government housing policies. In their study "Pollution and Prejudice" the California Environmental Protection Agency (CalEPA) found that neighborhoods redlined by HOLC in the 1930's have the highest average CalEnviroScreen (CES) scores today.³¹ The CES score measures the relative level of environmental burden experienced by a specific area, on a scale of 0 being lowest and 100 being highest. *Figure 5* below shows CES scores for the Alameda region.³² Comparing this image to the redlining map used by HOLC in the 1930's (refer to *Figure 4* shown in the previous section), we can clearly see that the redlined areas have higher CES scores.

³¹ CalEPA, "Pollution and Prejudice".

³² OEHHA, and CalEPA. "CalEnviroScreen 3.0." California Office of Environmental Health Hazard Assessment, 2017. <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>.

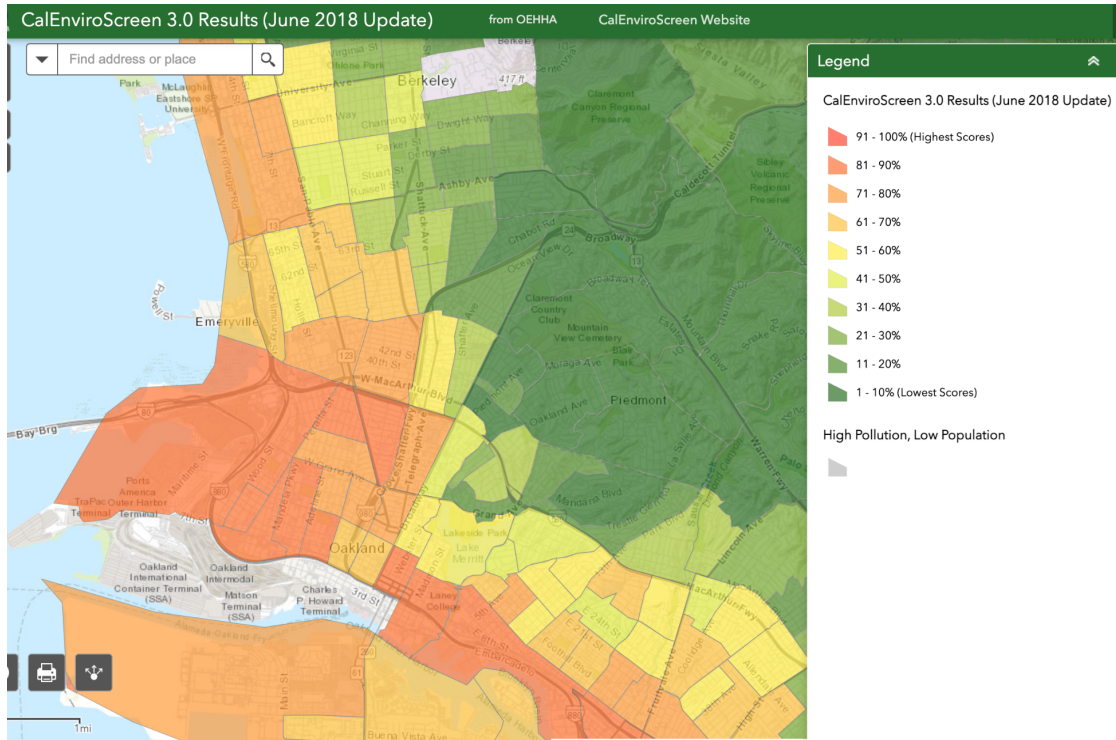


Figure 5. OEHHA, and CalEPA. “CalEnviroScreen 3.0.” California Office of Environmental Health Hazard Assessment, 2017.

<https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>.

Another study conducted with the purpose of assessing the association between historically discriminatory housing policies and present-day health disparities found that there was a positive relationship between emergency department visits due to asthma and decreasing HOLC risk grade.³³ This study used census tract data for eight cities across California and HOLC residential security maps to determine the relationship between current age-adjusted rates of emergency department visits due to asthma and HOLC risk grade. One of the cities included in this study was Oakland. The researchers found that across all eight cities, emergency department visits due to asthma were 2-4 times higher in previously redlined census tracts.

³³ Nardone, Anthony, et al. “Associations between Historical Residential Redlining and Current Age-Adjusted Rates of Emergency Department Visits Due to Asthma across Eight Cities in California: An Ecological Study.” *The Lancet Planetary Health*, vol. 4, no. 1, 2020, [https://doi.org/10.1016/s2542-5196\(19\)30241-4](https://doi.org/10.1016/s2542-5196(19)30241-4).

Additionally, they found that the proportion of the population that was made up of non-hispanic black, and Hispanic people, the percentage of the population living in poverty, and diesel particle emissions all increased as HOLC risk grade decreased from A to D. This data indicates a very clear relationship between historical redlining practices and various demographic trends, as well as increased incidents of asthma.

Figure 6 shown below is a map from the study comparing the HOLC risk grades from the San Francisco Bay Area with incidents of emergency department visits related to asthma in the same area. The comparison offers a very clear visual of how declining HOLC risk grade coincides with regions that have higher prevalence of asthma-related emergency department visits. *Figure 7* on the following page shows a box plot comparing age-adjusted rates of emergency department

visits due to asthma per 10,000 vs. HOLC risk grade from A to D, showing that incidents of asthma increase linearly as HOLC grade decreased.

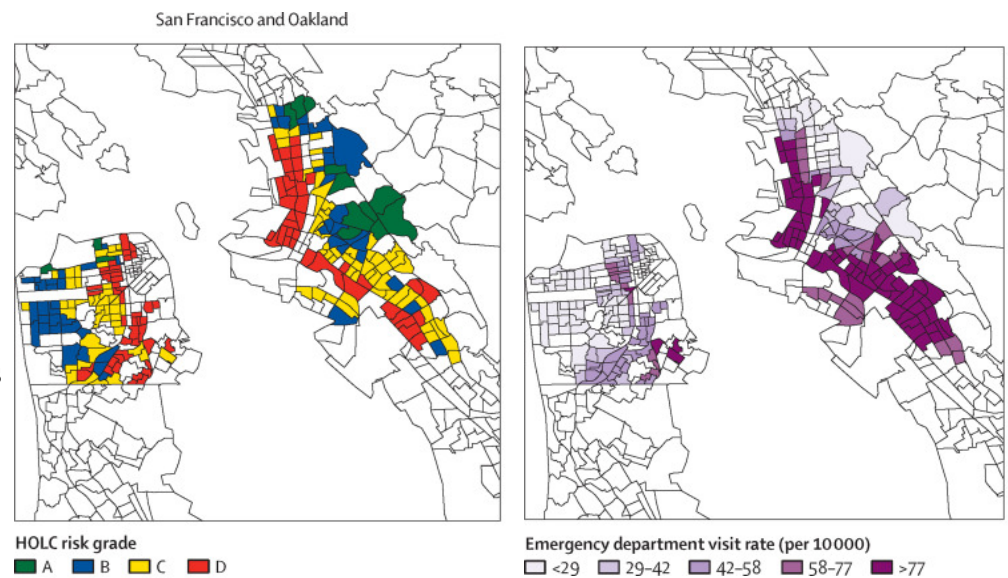


Figure 6. Nardone, Anthony, et al. "Associations between Historical Residential Redlining and Current Age-Adjusted Rates of Emergency Department Visits Due to "Asthma across Eight Cities in California: An Ecological Study." *The Lancet Planetary Health*, vol. 4, no. 1, 2020, [https://doi.org/10.1016/s2542-5196\(19\)30241-4](https://doi.org/10.1016/s2542-5196(19)30241-4).

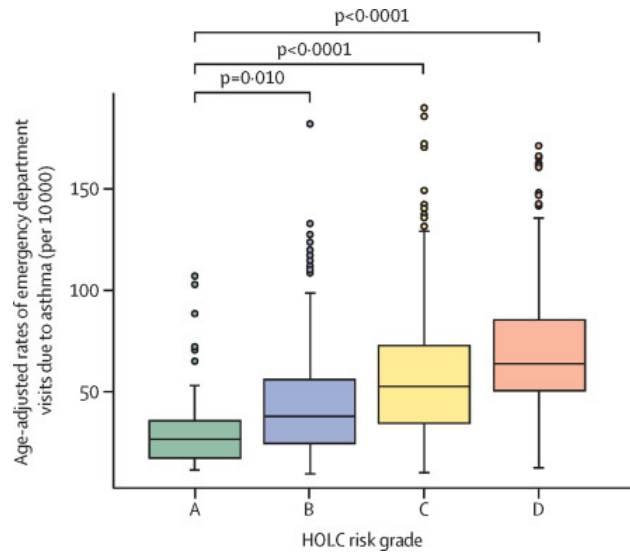


Figure 7. Box plot comparing age-adjusted rates of emergency department visits due to asthma per 10,000 vs. HOLC risk grade from A to D, showing that rates of asthma increase with worsening HOLC risk grade. Taken from Nardone, Anthony, et al. “Associations between Historical Residential Redlining and Current Age-Adjusted Rates of Emergency Department Visits Due to “Asthma across Eight Cities in California: An Ecological Study.” *The Lancet Planetary Health*, vol. 4, no. 1, 2020, [https://doi.org/10.1016/s2542-5196\(19\)30241-4](https://doi.org/10.1016/s2542-5196(19)30241-4).

In the 2020 study “*Historic Redlining and Urban Health Today in U.S. Cities*”, researchers explored the association between historic redlining and present-day urban health in 9 cities, one of which was Oakland.³⁴ They used shape files from redlining, U.S. census data, CDC data, and a combination of other health data to test the strength of association between historically redlined areas and 14 different health outcomes today. They found a strong association between historically redlined neighborhoods and current prevalence of cancer, asthma, poor mental health, and lack of health insurance. This study further exemplifies and solidifies the unignorable connection between institutional racism and modern day health inequities in West Oakland, California. Based on the evidence from these studies combined with the data provided in the preceding sections of this paper, I make the claim that the

³⁴ Nardone, Anthony, Joey Chiang, and Jason Corburn. “Historic Redlining and Urban Health Today in U.S. Cities.” *Environmental Justice* 13, no. 4 (2020): 109–19. <https://doi.org/10.1089/env.2020.0011>.

disproportionate burden of environmental pollution in West Oakland can in part be attributed to historically racist housing policies from the 1930's.

Conclusion

Across the entire world, human designs intersect with natural environments to produce landscapes of differentiated social and environmental consequences. Basing civilizations on dangerous gas-emitting activities not only threatens the stability of earth's climatic system, but it also threatens the survival of human beings in the present moment. More urgent still is the risk that these activities pose to people currently living in communities where industrial activities and human settlements sit side-by side, putting people who have been systematically discriminated against in the most vulnerable of positions. In West Oakland, California, residents face adverse health effects due to their exposure to air pollution from industrial activities, a situation stemming from the historical and present day binding of racism and capitalism. The goal of this project was to highlight the relationship between systemic racism and disproportionately distributed environmental pollution in order to show how the legacy of racist government actions coupled with the evolution of environmentally destructive economic development can produce landscapes of racially differentiated risk that constitute sites of environmental racism.

This project investigated levels of air pollution in West Oakland as compared to the rest of Oakland, the greater Alameda county, and the entire Bay Area in order to show that West Oakland experiences significantly higher rates of several different air pollutants that are harmful to human health. West Oakland has extremely high levels of toxic air pollutants and corresponding health disparities coinciding with a demographic characterized by majority low-income people of color. Dr. Mascarenhas explained that some of the key questions environmental justice scholars seek to answer include: *How is pollution distributed in society?*

*Are toxic environments shared equally amongst all citizens? Are particular groups of people disproportionately burdened by this risk society that we live in?*³⁵ Answering these questions often leads to the discovery that environmental issues are deeply intertwined with social issues. This paper draws on extensive research to show the ways that environmental pollution is distributed unevenly in Oakland according to socially constructed racial and economic lines. Examining the modern-day health outcomes of West Oakland residents within the context of historical government practices allows us to understand how the issue is intertwined with this nation's history of racism and capitalist development.

Racial discrimination is still alive and active throughout our society. Racial disparities remain entrenched long after slavery has been abolished. These inequities are exacerbated by the destructive environmental tendencies that form the backbone of our societies. Using Laura Pulido and Dr. Mascarenhas' definitions of environmental racism, it is evident that West Oakland is a site of environmental racism and environmental injustice, resulting from a long history of unequal capitalist development coinciding with institutionalized efforts to oppress, restrict, and marginalize specific groups of people. The result is that the residents of West Oakland now face absolutely devastating environmental health inequalities because they are constantly subjected to the harmful byproducts of industrial capitalism. This connection shows one situation in which environmentally destructive economic models have developed in tandem with institutionalized forms of oppression to create modern day instances of environmental racism.

³⁵ Mascarenhas, "A Lesson in Environmental Justice".

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