Cabrillo High School

Los Angeles County

INTERDISCIPLINARY ENVIRONMENTAL JUSTICE CASE STUDY

An Exploration of Environmental Governance Needs, Challenges and Opportunities

MARCH 2024

GROUP NO. 8

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CITE AS

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ABOUT

This case study report was developed by students at the University of California Irvine for the undergraduate class “Environmental Injustice,” taught by Kim Fortun, Margaret Tebbe, Prerna Srigyan, Ina Kim, and Luc McKenzie for the Department of Anthropology, Winter 2024. The University of California Irvine is on the ancestral homelands of the Tongya and Acjachemen nations.

COVER PHOTO

Image description: The view of the front of Cabrillo High School, gates lining the entrance and cars lining the pavement Source: Photo courtesy of The 562 org. (Screenshot by Sarah Hentges, January 25, 2024)

Indigenous Land Acknowledgement

Our project was cited specifically in L.A. County, focusing on the city of Long Beach, where we learned that the Tongva (Gabrieleno) Tribe occupied the unceded land. They lived in the entire L.A. Basin and the islands of Santa Catalina, San Nicholas, San Clemente, and Santa Barbara. Overall, taking over what is now known as Los Angeles and Orange County. In 1771, the Spanish turned their sights to conquering and enslaving the Tongva by using them as the slave labor force to build the Misión de San Gabriel Arcánge. The Gabrielino/Tongva Nation is not recognized by the federal government. Although they have contributed to the founding of California, to this day they are not allowed to claim and repatriate their ancestors' remains. The Tongva are not allowed to participate in the scholarship for Native Americans, nor allowed to sell traditional crafts without facing a fine of $250,000 and 5 years of imprisonment. The Gabrielino and Tongva Nation in the L.A. county has never received a reservation. However, the Federal Indian Claims Commission found that these two tribes were unjustly deprived of around 1.5 million acres of land. About 1500 - 2000 Tongva Gabrielino are still living on the reservations located in the Long Beach area. The County of Los Angeles has been actively engaged in uplifting the true histories of what is now L.A. County and is prioritizing equity for its communities and native people. Supervisors Solis and Hahn authored a motion to acknowledge and apologize for the historical mistreatments of California Native Americans by L.A. County. The country changed Columbus Day to be instead celebrated as Indigenous Peoples Day. Indigenous people and organizations in the County of Los Angeles are undertaking several specific actions to preserve their cultural heritage, lands, and rights. They are collaborating with local tribal governments and communities to document the historical injustices inflicted by the County government, seeking official apologies for past maltreatment and neglect. These efforts include working with relevant County departments to examine policies, procedures, and practices that may have harmed

California Native Americans and developing public statements to correct the historical record. Indigenous communities are also engaging in advocacy and awareness-raising activities, such as testifying before governmental bodies and disseminating information about their histories and traditions. Additionally, they are actively participating in initiatives like the Anti-racism, Diversity, and Inclusion Initiative (ARDI) and the Cultural Equity and Inclusion Initiative (CEII) to address disparities in health, economic, educational, and environmental outcomes for American Indian and Alaska Native communities. Through these concerted efforts, Indigenous peoples and organizations in the County of Los Angeles are working to assert their rights, promote cultural preservation, and achieve greater justice and equity. As UCI students, we could support the work of Indigenous people in our setting by contacting them and asking for their support. As well as acknowledge their efforts and support them in our case study.

BIOGRAPHICAL STATEMENT	PHOTO
Jay Chan I'm currently a first year undergraduate student with an undeclared major under ICS. I'm a Chinese-American from the Bay Area so I am currently dorming. Some of my hobbies include playing video games, working out, and playing the guitar!	
Kayley Frias-Ceballos I'm a second year undergraduate student majoring in Psychology B.S but in the process of change of major to Education. I'm from Santa Ana, CA, currently a Teacher Aid at a Child Development Center called Rainbow Rising in Irvine. I enjoy working with children and that's what I'm working towards to do in the future.	

Sarah Hentges I am a first year undergraduate student at UCI, majoring in Drama and pursuing a double major in Business Administration. I am from Huntington Beach, California. I am passionate about marketing, leadership, the arts world and business overall, and I hope to combine these interests in my future career.	
Kayla Jaussen: I'm a second year undergraduate student who's passionate about majoring in Criminology and Law. I also minor in physiological science. I grew up most of my life in Anaheim CA, and I chose to commute to school instead of dorming. I also happen to be a cast member at Disney for about a year now, so if you see me, feel free to say hi!	

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Ritvik Suraparaju I am a first year undergraduate student who is passionate about biology, and more specifically oncology and cancer detection, and I am currently dorming. I am originally from the Bay Area, and I love to talk to people about life. I look forward to meeting new people!	
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Jocelyn Varela Mares I'm a third year undergraduate student at UCI majoring in Public Health Policy with a double minor in Medical Anthropology and Health Informatics. I'm from San Diego, CA working as Brand Ambassador for American Eagle and soon will be working for the Child Abuse Serivces Center in Orange Country. After I graduate I plan to work as a Health Administrator hopefully overseeing patient care.	
Jayden Villagrana I am a first year Criminology, Law, and Society major at UCI. I was born in Los Angeles, CA and I have now been living in Anaheim CA for a couple years. In the future I would like to become a criminal lawyer working with juveniles. I am passionate about criminal justice reform and I would like to be apart of the change that I want to see in the future.	

PERMISSION TO PUBLISH @ https://disaster-sts-network.org Do you consent to having your name listed as an author on the published case study?		
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1. Kayla Jaussen	**Kayla Jaussen**	**Y**
2. Jay Chan	**Jay Chan**	**Y**
3. Yashas Raman	**Yashas Raman**	**Y**
4. Jocelyn Varela Mares	**Jocelyn Varela Mares**	**Y**
5. Sarah Hentges	**Sarah Hentges**	**Y**
6. Jayden Villagrana	**Jayden Villagrana**	**Y**
7. Johnson Nguyen	**Johnson Nguyen**	**Y**
8. Kayley Frias-Ceballos	**Kayley Frias Ceballos**	**Y**
9. Ritvik Suraparaju	**Ritvik Suraparaju**	**Y**
10. Justin Le	**Justin Le**	**Y**

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ABSTRACT

Problem statement: Air pollution resulting from oil refinery and Long Beach port-related traffic emissions has caused numerous health problems for communities surrounding Long Beach, including higher risks of cardiac disease, asthma, and other lung diseases. The area has long been known to be a hotspot for air pollution. (Nguyen 2024)

Aims: The aims of this case study are to describe the setting, hazards, stakeholders, and health harms resulting from the effects of pollution stemming from local refineries and traffic in Long Beach communities, noting divergent perspectives among stakeholders and in reporting about the levels of pollution and direct effects. Aim 2 is to mobilize and illustrate key environmental health concepts. Aim 3 is to translate the research findings of the case into further research and action proposals to help positively impact the greater Long Beach area. (Hentges 2024)

Methods: The case study is organized to address the ten questions in an Interdisciplinary Environmental Health Case Study Framework developed to allow comparison between cases. (Le 2024)

Findings: Our analysis of environmental and health hazards in Long Beach CA., resulting from air pollution due to oil refineries, ports, and traffic emissions, demonstrates the need and current advocating ideas and actions about what local and extra stakeholders (refineries, ports, residents, City Council, etc.) can do, and are currently in the process of doing to protect the impacted communities and create a green, “zero emissions” environment. (Jaussen 2024)

Intellectual Significance: This case study illustrates an interdisciplinary approach to addressing complex environmental health issues and the overall interplay between oil refineries, port-related traffic emissions, and their impacts on communities in Long Beach, CA. (Frias-Ceballos 2024)

Practical Significance: Our case study examines how there is a need for stricter regulations on pollutants from the industries near Cabrillo High School. This includes changing/improving the regulated pollutants that are released from the oil refineries and holding the companies accountable. Also, there is a need for better federal laws that protect the health of the residents nearby. (Villagrana 2024)

INTRODUCTION

This case study report examines environmental health and governance challenges and opportunities near Cabrillo High School, located in Los Angeles County, California, USA.

The report addresses a series of ten questions (Fig. 1) that draw out local details in a manner that encourages comparison with other places. The research has been done in a short time-frame so is limited and points to the need for further research and community engagement. The goal is to help build both a body of research on radiation governance around the world and a network of researchers ready to help conceptualize and implement next-generation radiation protections.

Environmental Injustice Case Study Framework

1. What is the setting of this case? What are its assets? What opportunities and challenges will there be in this setting in coming years?
2. What environmental threats are there in this setting?
3. What intersecting factors -- social, cultural, political, technological, ecological -- contribute to environmental health vulnerability and injustice in this setting?
4. Who are stakeholders, what are their characteristics, and what are their perceptions of the problems?
5. What have different stakeholder groups done (or not done) in response to environmental problems in this setting?
6. How have environmental problems in this setting been reported on by media, environmental groups, companies and government agencies?
7. What local actions would reduce environmental vulnerability and injustice in this setting?
8. What extra-local actions (at state, national or international levels) would reduce environmental vulnerability and injustice in this setting and similar settings?

9. What kinds of data and research would be useful in efforts to characterize and address environmental threats in this setting and similar settings?

10. What intersecting injustices -- data, economic, epistemic, gender, health, infrastructure, intergenerational, media, procedural, racial, reproductive -- contribute to environmental injustice in this setting?

FIGURE 1: This is the analytic framework that guided research for this case study.

In this analysis, we will cover a variety of environmental injustice concepts relating back to Cabrillo High School, Long Beach Unified School District, and Long beach as a whole. Some concepts most highlighted in our report will be environmental racism, environmental injustice, media injustice, slow disasters, stakeholders, fossil fuels, vulnerability zones, combo disasters, social determinants of health, and local actions.

Environmental Racism is the discriminatory placement of landfills, hazardous waste, or refineries being placed purposely in communities or neighborhoods that have particular racial demographics. Our case study relates to Environmental Racism because, the city of Long Beach and neighborhoods surrounding Cabrillo High School are mostly Latino/Latinx communities, and the placement of refineries and highways generating pollution is purposely around these particular communities based on income, health, and racial demographics. (Hentges 2024)

Environmental Injustice is when poor or marginalized communities that are harmed by hazardous waste, resource extractions and other unnecessary uses that do not benefit the land. The case study relates to Environmental Injustice because the city of Long Beach and its neighborhoods are to be primarily inhabited by low-income communities and communities of color. Long Beach does have homes close to oil refineries, chemical plants, and other industrial facilities that emit pollutants that are harmful to human health and the environment. (Frias-Ceballos 2024)

Media injustice occurs when news is not available to everyone. Our case study demonstrates media injustice because in Long Beach there is a large population of

immigrant residents and spanish-speaking individuals. Since most of the media covering environmental injustice is in english, residents are not able to access this information which then leaves them out of the conversation. Overall, they are not able to advocate for themselves when they don't have all the information on the issue. (Villagrana 2024)

Slow Disasters are disasters that emerge slowly, silently, and invisibly as it occurs over a long gradual period of time. Slow disasters don't generate an immediate emergency response, but slowly drives up cancer, asthma, cardiac problem rates, and other health effects due to the prolonged exposure to the slow disaster. Our case study relates to a slow disaster because the main problem affecting the Cabrillo High School and Long Beach area is the extended exposure to toxic air pollutants both originating from the LA/Long Beach Ports and numerous oil refineries in the area like the Marathon Petroleum Refinery. It's an ongoing problem that's been occurring for decades. (Nguyen 2024)

Stakeholders are any person, group, or organization that can place a claim on an organization's attention, direction, or resources. Our case study location involves several stakeholders, such as students and parents attending Cabrillo High School, workers and executives of the Marathon Petroleum LA Refinery, the largest refinery in California and a major cause of pollution in the area, ports in the area, and the local government in charge of regulating air quality in the area, as well as many more. (Raman 2024)

Fossil fuels are sources of energy that are mined, drilled, or burned. Examples of resources that are mined, drilled, and burned include coal and crude oil. Fossil fuels relate to our case study of Cabrillo High School, as the fossil fuel industry in Long Beach has greatly shaped the city's economic structure, meaning that Long Beach greatly depends on oil money. Communities near these rich corporations within the oil industry and oil refineries experience higher rates of a variety of health issues. (Suraparaju 2024)

A vulnerability zone is an area that could be greatly affected by a release from a chemical accident at a facility. If a chemical accident occurs, the affected area is called a vulnerability zone. It relates to the case study because Long Beach has many refineries nearby. If those refineries were to have a major accident, the long beach residents would

be affected heavily by it. All it takes is one small mistake to happen then thousands of lives are impacted. (Le 2024)

A Combo Disaster is multiple environmental disasters that can potentially overlap with one another, creating high impact harmful effects that are especially harmful to vulnerable communities that don't have access to the necessary resources. For Cabrillo High School in LA County, the ozone pollution and smog pollution both are an example of a combo disaster. The air pollution combined can create especially harmful effects through inhalation. These health effects are especially evident in minority communities due to intergenerational injustice that has led their communities to be considered disposable. (Chan 2024)

Social determinants of health are factors in which we live, our education access, social and community, the state of our environment all in which impacts on health. They are typically non-medical factors that influence our health outcomes that shape the conditions of our daily lives. This relates to our case study because LA-Long Beach has been known to be one of the worst ozone air pollution in the country. Residents in this community are being affected on a daily basis because of the environmental injustice they are facing. The air quality in Long Beach is affecting their health as they don't have the same access to quality air as others because of where they live. This is a major social determinant of health as it can lead to health problems such as asthma, respiratory illness, or cardiovascular conditions in the future. (Mares 2024)

Local actions are actions at the city or county level (or even smaller units, like school or neighborhood) by addressing specific health and environmental issues in their community. Our case study relates to Local Actions because as we do further research into the local actions of residents in Long Beach, we can see how the protest and the creation of alliances helped fight against their environmental disparities. Some examples of local actions in Long Beach are community plans to reduce pollution, student organizations to spread awareness, California's Clean Truck Program to ban heavier diesel pollution, stricter regulations of Long Beach SB 674 Bill, and the protests of local communities and residents. All these local actions are to fight against, and in hope,

minimize the air pollution that sicken the people of Long Beach and students of Cabrillo High School. (Jaussen 2024)

Each of these concepts will be covered in the analysis of the case study location below, discussed in detail regarding Long Beach and the local environmental injustice issues occuring the communities within the city.

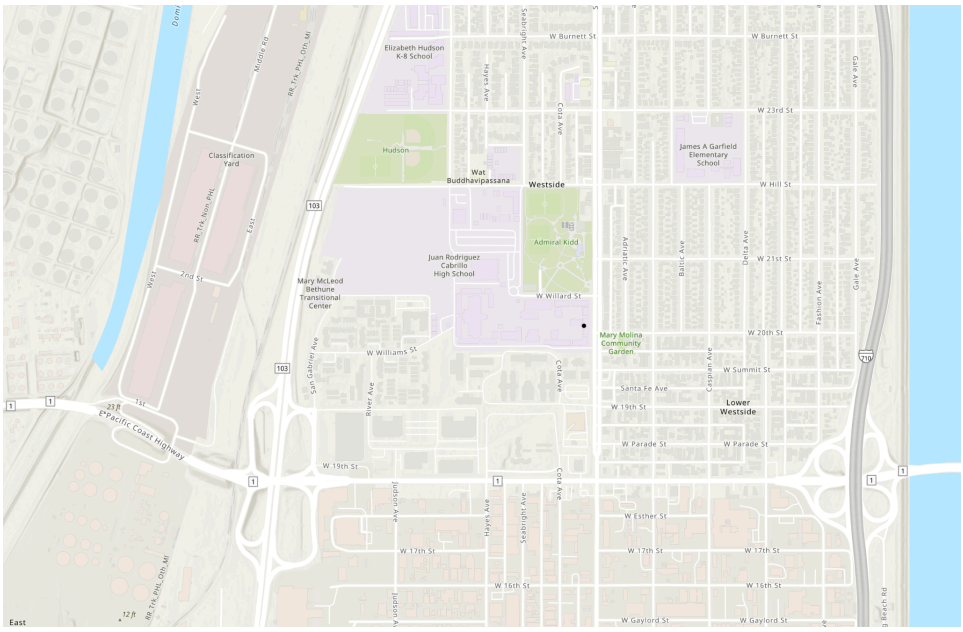

FIGURE 2: Focal School Location
Caption: Our case study will focus on Juan Rodriguez Cabrillo High School, which is located in Long Beach, LA County. The total minority enrollment is 99%, with 75.8% who are Hispanic. (Screenshot by Jocelyn Varela, January 25, 2024)
Source:
https://experience.arcgis.com/experience/24133d4eb5af4af2abf8e92b3f8fe65f/

1. COMMUNITY ASSETS & SETTING

High Income and Low Pollution

Yashas Raman

Juan Rodriguez Cabrillo High School is located in Long Beach, CA, a city heavily affected by pollution. Specifically, according to grades given by the American Lung Association, Long Beach ranks as the worst city in the United States in terms of ozone pollution, fourth worst in the country in terms of 24-hour particle pollution, and ninth worst in terms of annual particle pollution, showing the extent to which pollution affects air quality in the area (Hutchings 2023). Cabrillo High School particularly faces severe pollution as it is located in close proximity to Marathon Petroleum LA Refinery, the largest oil refinery in California (Wells 2023). This refinery is actually the combination of two other refineries, Marathon Carson Refinery and Marathon Wilmington Refinery, which were both built nearly a century ago. However, the two combined and began reporting as one single entity in 2019. Along with this refinery, several other refineries are present in the area surrounding Cabrillo High School, all of which significantly degrade air quality in the area. (California Energy Commission 2024).

According to the California Healthy Places Index, the housing habitability in the area surrounding Cabrillo High School is very low as several houses lack basic facilities,

which indicates the poor housing quality in the area. The California Healthy Places Index also indicates very crowded housing in the area surrounding Cabrillo High School, as it is in the 4th percentile for uncrowded housing, which tracks the number of households with two or more occupants per room (Nguyen 2024). These measures show that the community in the area around Cabrillo High School is of relatively lower socioeconomic status. This goes in line with statistics from US News, which claim that 69% of students attending Cabrillo High School are economically disadvantaged (US News 2024). The economic disadvantages of the people living around Cabrillo High School also significantly increase the effects of pollution in the area on the people, as they will be less equipped to deal with the climate effects.

One community asset that could potentially help address the issue of pollution in the Long Beach area, and decrease the risk for the community surrounding Cabrillo High School, is the South Coast Air Quality Management District (AQMD). The South Coast AQMD's job is to control smog and improve air quality in the Long Beach area through creating and enforcing plans in the Long Beach area which comply with federal and state air quality standards and guidelines as well as responding to air quality complaints. They also generally monitor and inspect air quality near refineries due to the emissions they emit (South Coast AQMD 2024; Nguyen 2024). The South Coast AQMD could be an extremely useful community asset as they have the power to both know and be informed about issues regarding air quality in the area, as well as report and send that information to other people in order to inform the public about air quality issues. Since they are directly involved in dealing with poor air quality, they could also be instrumental in devising new plans with which to mitigate air pollution and improve air quality.

Another community asset to help combat pollution in the area is the East Yard Communities for Environmental Justice. EYCEJ is a non-profit community organization that amplifies the voices of underrepresented communities in order to persuade and influence policymakers and effect policy change that implements health-protective

environmental justice policies that benefit individuals on a local, regional, and statewide level. The EYCEJ attempts to create a safer and healthier environment for underrepresented communities and those who are more harshly affected by the effects of environmental injustice. The EYCEJ collaborates with stakeholders and influencers from several different perspectives in order to enhance the movement for environmental health and justice, across local, statewide, national, and global levels. (East Yard Communities for Environmental Justice 2024; Jaussen 2024).

However, the level of pollution in the Long Beach area has begun to show improvement over recent times. Specifically, the amount of particle pollution in the area has been decreasing slowly over recent years, which shows that progress is being made in terms of improving air quality. However, the level of pollution is still at a significantly higher level than is sustainable. Therefore, it is still extremely necessary to continue making progress towards improving the air quality. For example, it is important to keep working towards plans such as the one suggested by Kim White of the South Coast AQMD, which aim to create a zero-emissions economy (Hutchings 2023). Furthermore, there are still 23 fast disasters currently occurring in the area surrounding Cabrillo High School, all of which emit large amounts of harmful chemicals, which could all cause significant health problems to the community (EcoGovLab 2024; Le 2024). Although strides are being made to remedy air pollution in the area, the presence of these disasters and continued poor air quality mean that it is absolutely essential to continue working towards and finding solutions as soon as possible.

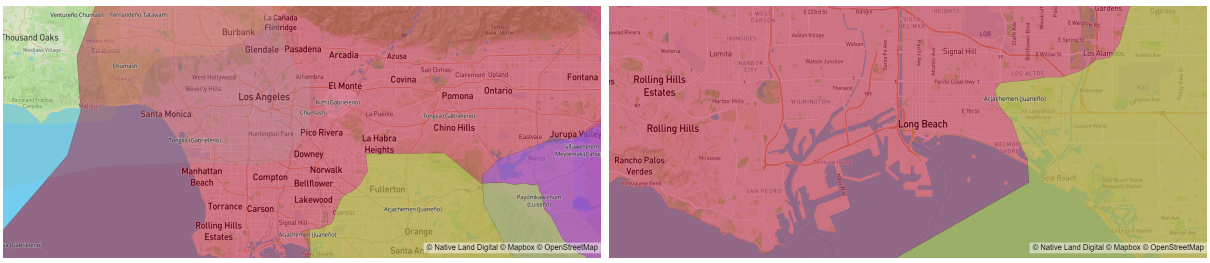

Figure 3: Native Land Acknowledgement
Kayla Jaussen
Caption: L.A. County, specifically focusing on the city of Long Beach, occupies unceded land belonging to the Tongva (Gabrieleno) tribe.
(Screenshot by Kayla Jaussen, January 25, 2024)
Source: https://native-land.ca/

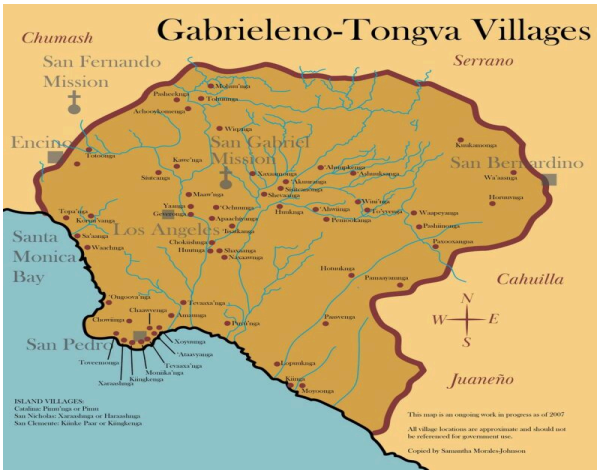

Figure 4: Native Representations of Land
Kayla Jaussen
Caption: This map shows the location of the Gabrielino-Tongva villages before colonization (screenshot by Kayla Jaussen, January 25, 2024)
Where did they live?
The Tongva occupied the entire L.A. Basin and the islands of Santa Catalina, San Nicholas, San Clemente, and Santa Barbara, taking most of what is now LA. and Orange County. This was up until the Europeans colonized their land. Despite the European incursion, they have remained an integral part of the Southern California community.
Source: https://www.gabrieleno-nsn.us/maps

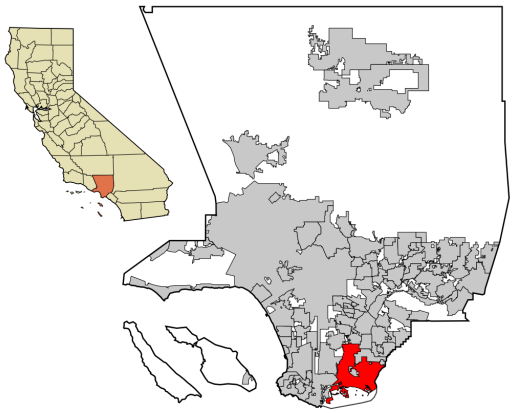

Figure 5: Geographic Context
Caption: Long Beach is located in the southern Los Angeles County of California.It is also about 20 miles south from Downtown Los Angeles. Long Beach also has many immigrant origins from the Philippines, El Salvador, Mexico, Vietnam and Cambodia. (Screenshot by Kayley Frias-Ceballos, January 24, 2024)
Source: https://simple.wikipedia.org/wiki/Long_Beach,_California

Figure 6: Setting Photograph
Caption: This map shows the Port of Long Beach which is the second busiest container port in the United States and is among the world's largest shipping ports (Screenshot by Jocelyn Varela, January 25, 2024).
Source: https://experience.arcgis.com/experience/24133d4eb5af4af2abf8e92b3f8fe65f/

Figure 7: Natural Resources and Biodiversity Photograph
Caption: The El Dorado Nature Center is found in the city of Long Beach. Nestled between the San Gabriel River and the 605 freeway. It's an oasis of natural habitat, home for animals and plant life covering 105 acres of protected land.
(Screenshot by Kayla Jaussen, February 8, 2024)
It has dirt trails, two lakes, a stream, forested areas and a visit center with an art gallery, gift shop, and educational displays.
Source:
https://www.longbeach.gov/park/park-and-facilities/parks-centers-pier/el-dorado-nature-center/#:~:text=Nestled%20between%20the%20San%20Gabriel,for%20animals%20and%20plant%20life

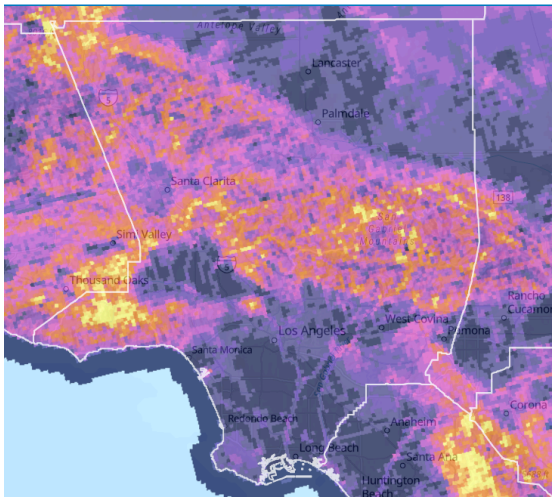

Figure 8: Biodiversity Map
Caption: Southern Los Angeles County, which is where Long Beach is located, has relatively low biodiversity at risk. However, other areas of the county such as the central and western regions have quite high biodiversity at risk.
Source: https://arcg.is/1TK54v

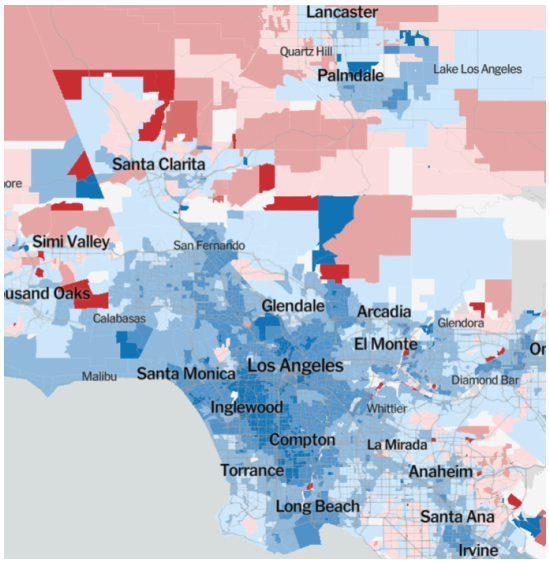

Figure 9: 2020 Presidential Election Results
Caption: Los Angeles County voted quite liberally in the 2020 presidential election, with 71% of voters voting for Biden. Voters in Cabrillo High School's precinct essentially mirrored the trend seen across the rest of the county, with 70% of voters voting for Biden.
Source: https://arcg.is/1TK54v

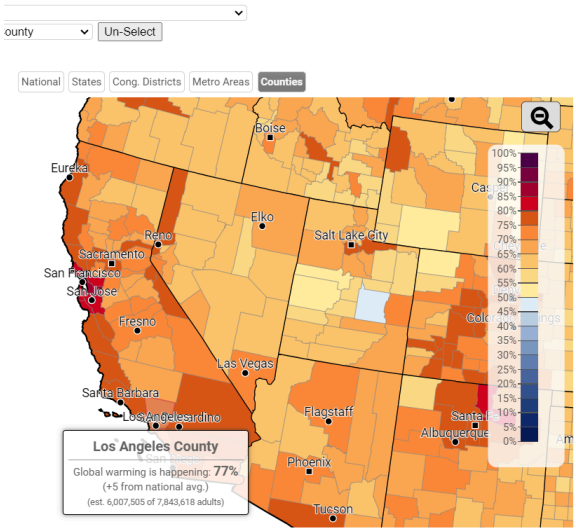

Figure 10: Yale Climate Change Opinion Map
Caption: This map looks at the percentage of adults who believe global warming is happening. 77% of adults in Los Angeles County believe that global warming is happening, which is equal to the California average, but 5% greater than the national average.
Source: https://climatecommunication.yale.edu/visualizations-data/ycom-us/

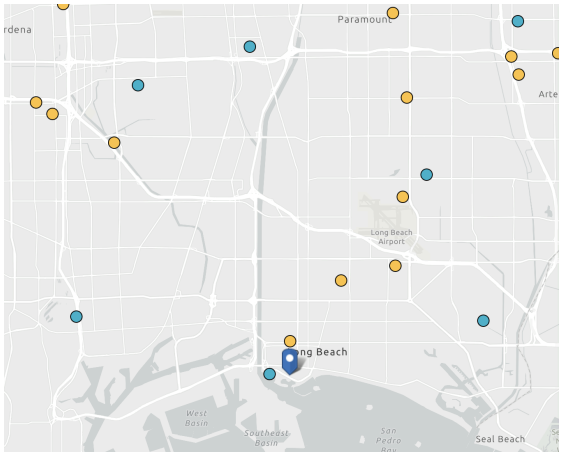

Figure 11: Higher Education Map
Caption: Most of the higher education institutions in Long Beach are Private For-Profit. There are no Private Non-Profit higher education institutions near Cabrillo High School (Screenshot by Jocelyn Varela, February 01, 2024).
Source: https://nces.ed.gov/ipeds/collegemap/

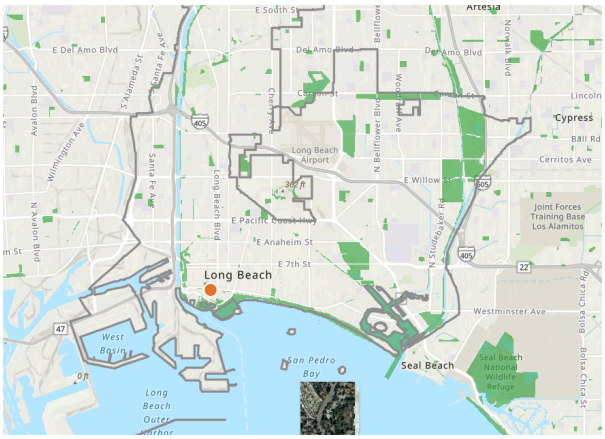

Figure 12: Playgrounds Map
Caption: Cabrillo high school is located directly next to Admiral Kidd Park, one of the only parks in the north western part of Long Beach. (Screenshot by Jay Chan, January 25th, 2024).
Source: https://parkserve.tpl.org/mapping/index.html#/?CityID=0643000

2. ENVIRONMENTAL HAZARDS

Unveiling the Impacts of Long Beach

Jocelyn Varela Mares and Jayden Villagrana

Diesel PM Exposure

One of the main hazards affecting Long Beach is diesel particulate matter exposure. Diesel particulate matter exposure is created from trucks, buses, trains, ships, and other vehicles with diesel engines that emit a mixture of pollutants. Since Long Beach is the second largest port in the U.S. with 22 shipping terminals, there are harmful pollutants entering the environment daily. Due to the large port, there is an increased amount of semi-trucks transporting the cargo to other places or delivering to nearby industrial facilities. According to CalEnviro, Cabrillo High School is in the 86th percentile for diesel particulate matter in California (Nguyen 2024). Additionally, “Cabrillo High School is just over 500 feet away from W Pacific Coast Hwy, which carries more than 30,000 cars per day” (Suraparaju, 2024). As stated by the EPA, this poses a local risk to residents of Long Beach because diesel PM is comprised of 8% PM 2.5, which is a known health hazard. Due to the traffic pollution “PM 2.5 is in the 66th percentile” (Suraparaju

2024). Exposure to diesel particulate matter can lead to serious health conditions such as respiratory issues, cardiovascular effects, and impaired lung function. Diesel PM contains fine particles that can penetrate deep into the respiratory system, causing respiratory problems such as asthma and bronchitis (“Learn About Impacts of Diesel Exhaust and the Diesel Emission Reduction Act”, 2023). It’s estimated that about 70% of the total known cancer risk related to air toxins in California is attributable to DPM (“Overview: Diesel Exhaust & Health”, n.d). Certain populations are particularly vulnerable to the health effects, including children, the elderly, people with pre-existing medical issues, and those living in low-income neighborhoods. The American Lung Association released its 2019 "State of the Air" report, stating that people living in Southern California "face the most challenging air pollution levels in the United States." Will Barrett, Director of Clean Advocacy at the ALA, stated that neighborhoods near ports and highways, as well as individuals with asthma, the elderly, and lower-class residents, are often disproportionately impacted by particle pollution (Nahigyan, 2019).

Hazardous Waste

Another hazard that we identified in Long Beach is hazardous waste that is released from oil refineries, ports, and other industrial facilities. It can include used automotive oil as well as highly toxic waste materials produced by facilities and businesses. Hazardous waste from oil extraction can release toxins such as benzene, ethylbenzene, and n-hexane (EPA). These are only a small amount of hazardous pollutants that are released daily which create poor air quality for residents living near these facilities. According to CalEnviroScreen, Cabrillo High School has more hazardous waste

generators and sites than 99% of all sites in California and its main sources are bad waste management and chemical usage (Le, 2024). This poses a local risk because along with the many hazardous waste generators near the school, there is also a permitted hazardous waste storage facility in the middle of a residential area. This is especially harmful because residents may not be aware that they are living next to this facility. According to the California Office of Environmental Health Hazard Assessment, hazardous waste can cause "Contamination of air, water and soil near waste generators and facilities can harm the environment as well as people." The people living in this neighborhood are facing pollutants from the air, water, and soil making it impossible for them not to be affected by the waste that the city is trying to control. Hazardous waste can cause severe health effects including behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, physical deformations, and birth defects ("Health and Ecological Hazards Caused by Hazardous Substances", 2023). Vulnerable groups affected by hazardous waste in Long Beach include children attending Cabrillo High School, as the school has more hazardous waste generators than 99% of locations in California. Those in low-income communities who may lack resources for proper health protection also face a burden as many waste storage facilities are nearby.

Water Contamination

A third hazard in Long Beach is the water contamination from pollutants in the area. According to the EPA, "Germs and chemicals can get in drinking water at the water's source or in the distribution system after the water has already been treated. Harmful germs and chemicals can get in the water from many sources". According to

CalEnviroScreen, Cabrillo High School is located in a census tract that is in the 35th percentile for drinking water contaminants in California. Cabrillo's drinking water contains high levels of arsenic, gross alpha radiation, haloacetic acids, lead/copper, nitrate, and Trihalomethanes (Nguyen, 2024). Also, 99% of the tract either contains or is nearby water bodies containing 21 impairments (Le, 2024). Over the years there have been multiple sewage spills that contaminate the waters and cause beach closures. Coming in contact with the contaminated water also causes health issues. This is a health risk for the residents and students because the water is unsafe to consume or even come in contact with in certain areas of Long Beach. Water contamination causes exposure to pollutants like lead, arsenic, and other toxins that can have detrimental effects on one's health. Chronic health effects, such as developmental abnormalities in children and increased risks of cancer, neurological diseases, and reproductive problems in adults, can arise from long-term exposure to tainted drinking water (Nahigyan, 2019). Water contamination is a risk for Long Beach residents and students, particularly those enrolled in Cabrillo High School. The school lies in a census tract with elevated levels of lead and arsenic, among other toxins (Villagrana, 2024). This puts residents and young children at risk for developmental problems as a result of exposure. Communities of color may be disproportionately exposed to contaminated drinking water since they frequently live in regions where environmental justice issues are present.

Greenhouse Gas Emissions

A fourth hazard affecting Long Beach is the large amount of greenhouse gas emissions being released daily. Specifically, pollutants such as nitrogen oxide, carbon

dioxide, sulfur oxides, and methane. The main sources are the ports, traffic, refineries, and rail yards. Within these industrial facilities, these gasses are created through the burning of fossil fuels, solid waste, and chemical reactions. According to the U.S EPA, In 2021 levels of nitrogen oxide rose 35% in Long Beach and sulfur oxides had a 145% increase from 2020. This shows that the amount of pollutants in Long Beach is only increasing with time. As stated by the EPA, “Each of these gasses can remain in the atmosphere for different amounts of time, ranging from a few years to thousands of years”. Since Long Beach is constantly producing a variety of emissions, a mixture of these pollutants will continue to affect residents for many more years. According to Cal Enviro, Cabrillo High School has a pollution burden of 90% (Jaussen, 2024). With emissions being a major problem in Long Beach, this creates a risk for other climate change impacts to occur. This is especially harmful to younger students who still have developing lungs. The human body can withstand brief exposure to these pollutants but prolonged exposure to high concentrations of these gasses is harmful. The respiratory system, cardiovascular system, central nervous system (CNS), immune system, digestive system, and frequently the reproductive system are among the primary organs that are gradually impacted by long-term exposure (“Climate Change Impacts on Health”, n.d) The high levels of greenhouse gas emissions in Long Beach have an adverse effect on a number of vulnerable populations, including “inhabitants of Los Angeles County, teachers, high school students, and the elderly”(Chan, 2024). Low-income households are people of color often already living near factories, ports, and major roadways that emit air pollutants and make them move vulnerable (Munguia, 2021).

Refinery Explosions/Leaks

Adding on, another hazard that can occur in Long Beach is refinery explosions or leaks. There is always a risk of having refineries so close to residential areas. Something can go wrong or an accident could occur and toxic chemicals would be released quickly affecting the environment and nearby residents. The sources include Marathon Petroleum LA Refinery, Valero Wilmington Refinery, World Oil Terminals, etc. Near Cabrillo High School, there are 9 oil storage tanks, 5 oil refinery storage tanks, 4 crude oil pipeline spills, and 4 gasoline pipeline spills (RefineryMaps.com). There have been refinery accidents in Long Beach in the past, therefore, it can happen again. Even though there haven't been any large accidents recently, there are still toxic releases from the facilities in this area. According to CalEnviro, the toxic release percentile near Cabrillo High School is 100. Since small leaks often go unnoticed, this can be more dangerous and one of the many driving forces for the different health impacts. With such a high amount of toxins in the air constantly this is harmful to the students and residents nearby. Living near a refinery can include a risk of asthma, cancer, birth defects, neurological damage, cardiovascular damage, difficulty breathing, and blood disorders (Nahigyan, 2019). The area is also predominantly Hispanic/Latino (68.7%), meaning that this group is disproportionately affected by the toxic haram of refineries. According to a National Hispanic Medical Association study, Latinos are “51 percent more likely to reside in areas with dangerously low ozone levels, and over two million of them live less than 0.5 miles from oil and gas installations” (Orozco, 2021). Millions of people could be at risk if a refinery experienced a major catastrophic event since the toxins “could extend up to ten

miles from the refinery," according to the director of health protection for Los Angeles County. “Emergency responders, emergency rooms, and burn centers would be overwhelmed and unprepared” as many of the hospitals are not equipped to handle emergency situations (Nahigyan, 2019).

Lead Exposure

Furthermore, residents in Long Beach face high amounts of lead exposure on a daily basis. According to Cal Enviro, the surrounding neighborhoods around Cabrillo High School are in the 90th percentile for lead risk from housing. Since neighborhoods around the school are older, children are being exposed to high amounts of lead in the house paint. Adding on, almost 60% of the homes in this area have a likelihood of lead-based paint hazards with 25% being low-income. The overall lead risk in the area is in the 96 percentile which can come from older water pipes and other lead-based products. This poses a local risk for children in the area that are most vulnerable to this hazard. They still have a developing brain and lungs which makes it easier for the lead to be ingested. As stated by Cal Enviro, “Young children are especially susceptible to the effects of lead exposure and can suffer adverse health effects, particularly in the brain and nervous system”. Lead exposure can occur from both environmental and occupational sources. either by consuming lead-contaminated dust, water (from leaded pipes), food (lead soldered containers), or by inhaling lead particles produced by burning objects containing lead. Lead is known to have a variety of negative health impacts, including” learning difficulties, behavioral issues, seizures, and even death”. Children's health may suffer grave

implications from lead exposure. “High lead exposure levels have the potential to seriously harm the brain and central nervous system, leading to coma, convulsions, and even death” (“Lead Poisoning”, n.d). Even after recovering from acute lead poisoning, children may always have behavioral issues and an intellectual impairment. Adults may experience “memory loss, neurological abnormalities, muscle and joint discomfort, high blood pressure, hypertension, and problems with reproduction” (“Lead Poisoning”, n.d). The populations most at risk from lead exposure include children, expectant mothers, low-income neighborhoods, and specific occupational groups (Villagrana 2024). Since their brains are still developing and their “neurological systems are extremely susceptible to the poisonous effects of lead, children—especially those under the age of six”—are the most vulnerable to exposure to the toxic metal (“What are some of the health effects of lead”, n.d). Pregnancy-related lead exposure puts the growing fetus and the mother at danger. It can have a detrimental effect on “embryonic development and result in stillbirths and miscarriages. Some minority groups may be more vulnerable to lead exposure, especially those with low income”. Issues with environmental justice may have a disproportionate role in the concentration of lead risks in some neighborhoods such as those in low income neighborhoods.

Oil Extraction

Additionally, since Long Beach has many different oil refiners, there are thousands of wells and extraction sites. According to LongBeach.gov, Wilmington Oil Field which is the third-largest oil field in the U.S. has a total of 6,150 wells drilled to date with 1,550

active wells. This is only 1 of the many oil companies that drill in Long Beach. The oil wells release harmful pollutants into the air and water which affects residents living nearby. They release toxins such as methane, carbon dioxide, and VOC emissions. According to environmentameria.org, “An average of 66% of active and idle oil wells leak methane”. This poses a local risk for residents living in Long Beach because many of the oil wells are near low-income neighborhoods. Families that have been living in this area for years are constantly exposed to pollutants and toxins released from the active and inactive wells. Any spills from oil extraction can have detrimental health effects. The most common symptoms include “coughing and asthma attacks, throat irritation, headaches, nausea, difficulty sleeping, and even an increased risk of cancer and cardiovascular disorders” (Earthworks, n.d). Some of the most vulnerable groups are low income communities as many oil wells are located near low income communities exposing residents with limited resources to higher concentration of contaminants. Children and pregnant women, elderly individuals, occupational exposure, and of course residents of Long beach are among the most vulnerable. Air pollution can “aggravate respiratory and cardiovascular disorders, which can worsen pre-existing medical diseases in children, pregnant women, and the elderly” (O’Cahllghan-Gordo, 2016). Residents of Long Beach are also exposed to oil spills, which can have a significant impact on the local population, particularly in regions where oil extraction is carried out. Workers in the oil and gas business, including those engaged in extraction activities, are subject to direct occupational exposure.

Cleanup site exposure-

Lastly, along the perimeter of Cabrillo High School, there are several clean-up sites that are contaminated with hazardous chemicals. “These sites include manufacturing facilities, processing plants, landfills, and mining sites” (EPA). According to Cal Enviro, the school is located in the 41% percentile for clean-up site pollutants. Though directly near the school, in a different census tract, the percentile is at 99%. This is a local risk for residents because the pollutants can move through the air and groundwater. It takes years to clean up these sites so the residents in the area would continue to face poor environmental conditions affecting their health. As stated by Cal Enviro, “Scientists have found toxic metals in house dust and pesticides in the blood of people who live near contaminated sites.” Clean up sites have also been known as superfund sites but many of these superfund sites have been linked to negative health effects including infant mortality, mental health, water and food-borne illness, and cancer. Certain demographics, including children, expectant mothers, and the elderly, may be especially vulnerable. Children are among the most susceptible demographics that will be exposed to cleanup sites because of their developing bodies, underdeveloped immune systems, and prolonged outside time; they are particularly vulnerable to the harmful effects of environmental pollutants on their health. Another susceptible group that is more sensitive is expectant mothers. Pregnancy-related exposure to contaminants at cleanup sites can have serious effects on the growing fetus and the mother, increasing the chance of miscarriages and birth problems. Low-income neighborhoods are disproportionately impacted because

many of them have poor housing conditions, limited access to healthcare facilities, and other factors that increase the health risks these individuals confront.

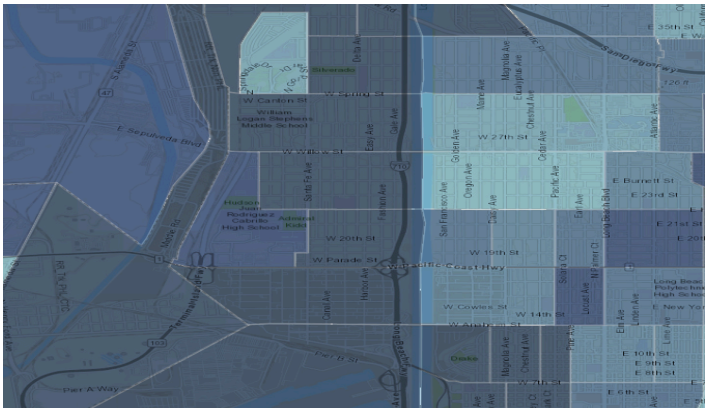

Figure 13: Diesel PM Exposure
Caption: Cabrillo High School is located in a census tract that is in the 86th percentile for diesel particulate matter in California.. 86th percentile means it's higher than 86% of the census tracts in California for diesel emissions. Sources nearby emit 0.417 tons of diesel per year. (Screenshot by Johnson Nguyen, Feb. 8, 2024)
Source:
https://experience.arcgis.com/experience/ed5953d89038431dbf4f22ab9abfe40d/

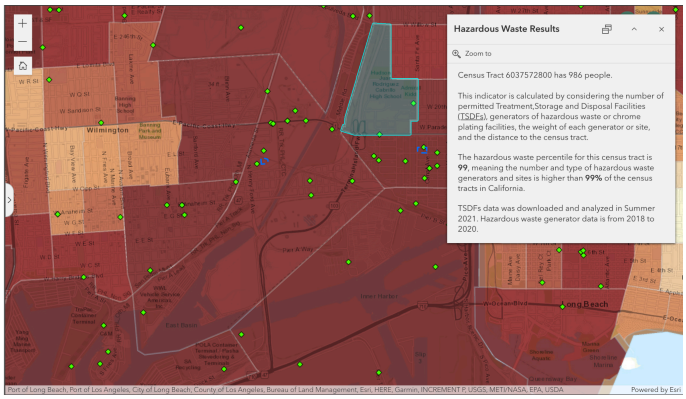

Figure 14: Hazardous Waste
Caption: Cabrillo High school has more hazardous waste generators and sites than 99% of all sites in California (Screenshot by Justin Le, Jan 25th 2024)
Source: Cal Enviro

Figure 15: Drinking Water Contaminants
Caption: Cabrillo High School is located in a census tract that is in the 35th percentile for drinking water contaminants in California. Cabrillo's drinking water contains high levels of arsenic, gross alpha radiation, haloacetic acids, lead/copper, nitrate, and Trihalomethanes. (Screenshot by Johnson Nguyen, Feb. 8, 2024)
Source:
https://experience.arcgis.com/experience/ed5953d89038431dbf4f22ab9abfe40d/page/Indicators/?data_id=widget_307_output_0%3A0%2CdataSource_37-17c3c3b4658-layer-1%3A7524&views=Drinking-Water-Contaminants

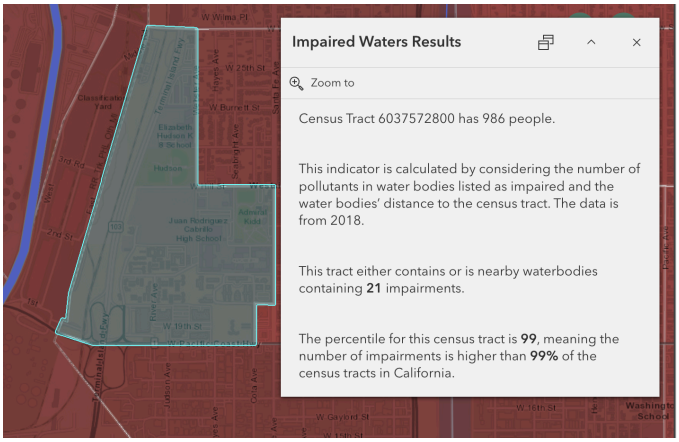

Figure 16: Impaired Waters
Caption: For the percentile it means that the number of pollutants in the water in Cabrillo High School is higher than 99% of all sites in California. Meaning that the water is hardly safe to consume. (Screenshot by Justin Le, Jan 25th 2024)
Source: Cal Enviro

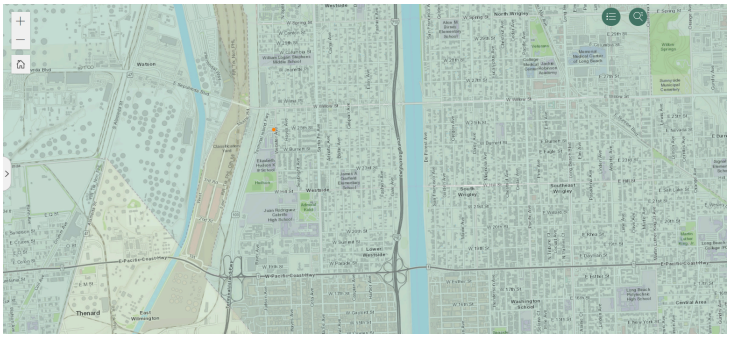

Figure 17: Ozone Exposure
Caption: Juan Rodriguez High School is in a census tract, in the 21st percentile for ozone exposure in California. Also, it is right next to an ozone monitor (marked by the orange dot) (Screenshot by Ritvik Suraparaju, January 25th, 2024).
Source:
https://experience.arcgis.com/experience/ed5953d89038431dbf4f22ab9abfe40d/page/Indicators/?data_id=widget_307_output_0%3A0&views=Ozone

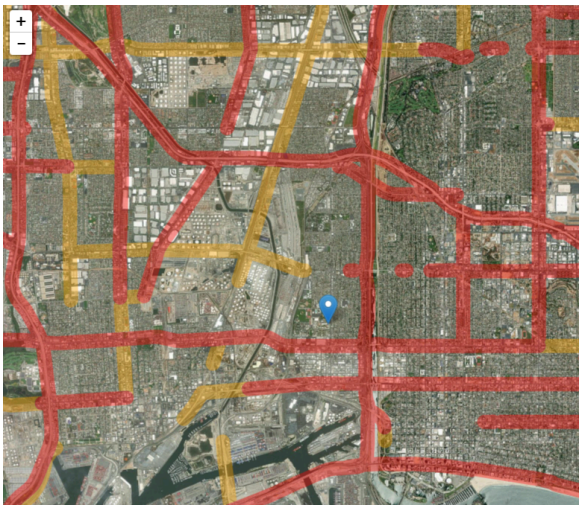

Figure 18: Traffic Proximity
Caption: Juan Rodriguez Cabrillo High School is just a little over 500 feet away from W

Pacific Coast Hwy (the road below), a highway carrying more than 30,000 cars per day (Screenshot by Ritvik Suraparaju, January 25th, 2024).
Source:
https://publicintegrity.org/environment/the-invisible-hazard-afflicting-thousands-of-schools/

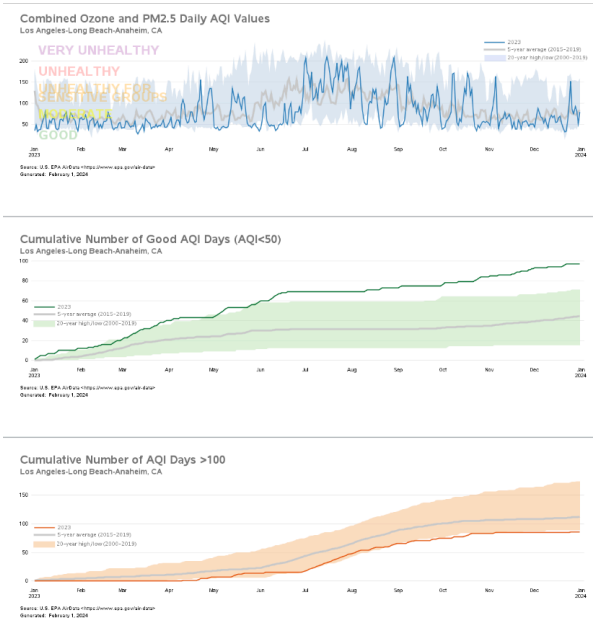

Figure 19: Daily Air Quality Tracker
Caption: Looking at the Cumulative Number of Good AQI Days, 2023 is at its highest compared to the 5-year average. However, if we look at the Combined Ozone and PM2.5 Daily AQI Values, Los Angeles County and Long Beach are now more unhealthy in 2023 compared to the 5-year average from 2015-2019. As of Jan 2024, L.A. County is marked as Unhealthy for Sensitive groups.
(screenshot by Kayla Jaussen, February 1, 2024).
Source:
https://www.epa.gov/outdoor-air-quality-data/air-data-daily-air-quality-tracker

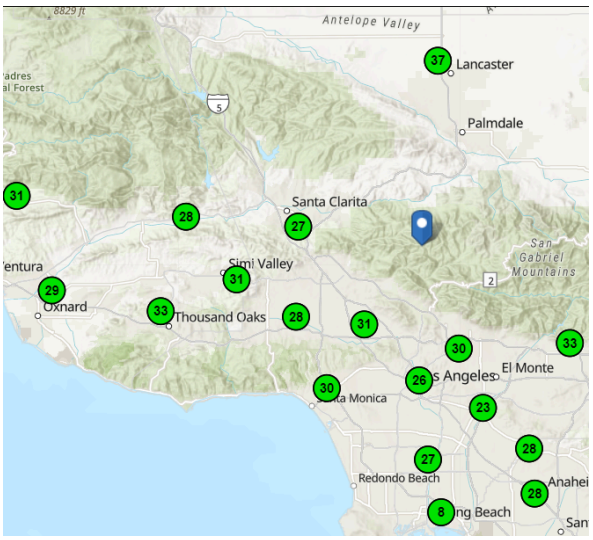

Figure 20: Government Air Quality Monitors
Caption: At the time this map was generated, all of Los Angeles County had good air quality. There are twelve monitors in Los Angeles County, including one located in Long Beach, the location of Cabrillo High School. The monitor in Long Beach reports very good air quality as well. (Screenshot by Yashas Raman, February 8, 2024)

Source: https://gispub.epa.gov/airnow/?showgreencontours=false

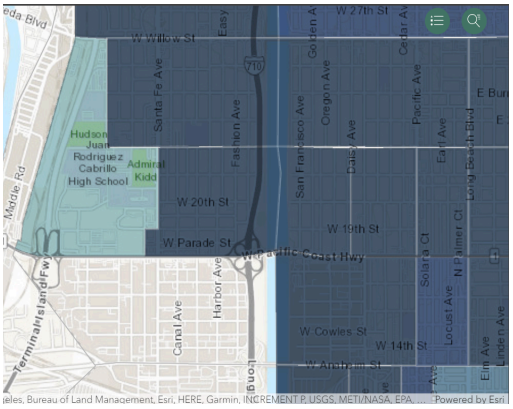

Figure 21: Childhood Lead Exposure
Caption: Cabrillo High School is located in a census tract that is in the 31 percentile for lead risk in California. The community is at a potential risk of lead exposure in the children living in low-income communities with older housing. There is a 0.2% of children between the ages 0-5 that have elevated blood levels. (Screenshot by Kayley Frias-Ceballos, February 1, 2024)
Source: Lead-Risk-from-Housing & Children Blood Levels

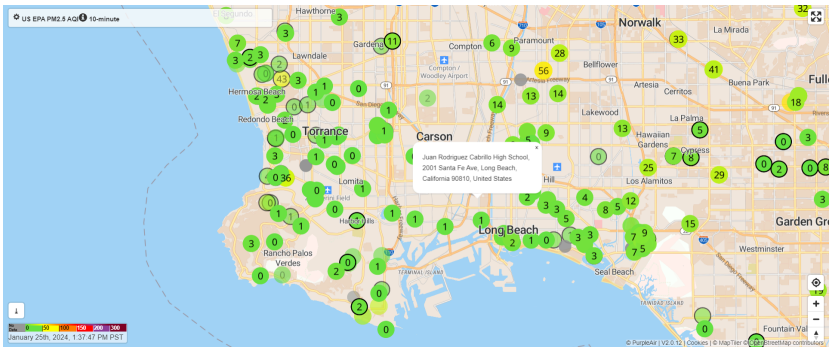

Figure 22: Purple Air Quality Monitors
Caption: In the area surrounding the school, there are many monitors surrounding the high school, with two or three of them being really close. It looks like the air quality might be worse north of the school (Screenshot by Ritvik Suraparaju, January 25th, 2024).
Source:
https://map.purpleair.com/1/mAQI/a10/p604800/cC0#10.65/33.8021/-118.2667

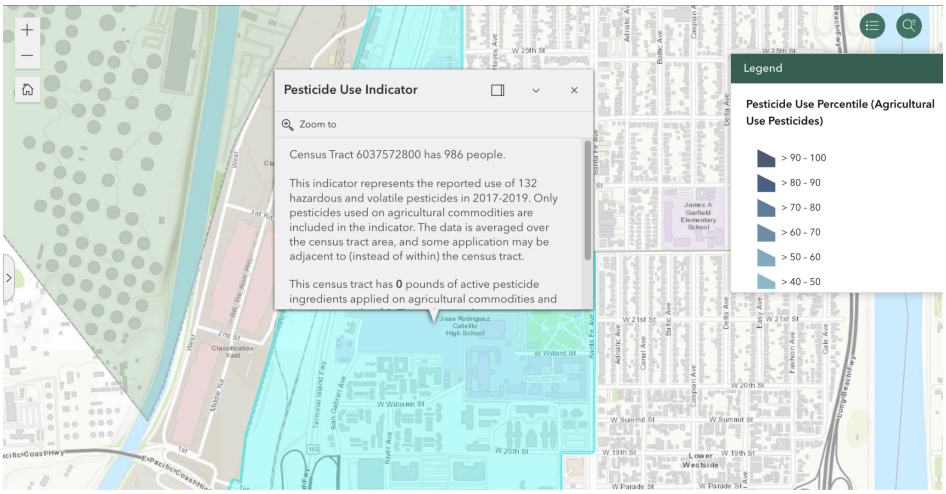

Figure 23: Pesticide Exposure
Caption: Pesticide use in this area is in the 0th percentile of use. Which means that the use of pesticides is close to none compared to other sites in California. (Screenshot by Justin Le, Feb 8th 2024)
Source: Cal Enviro

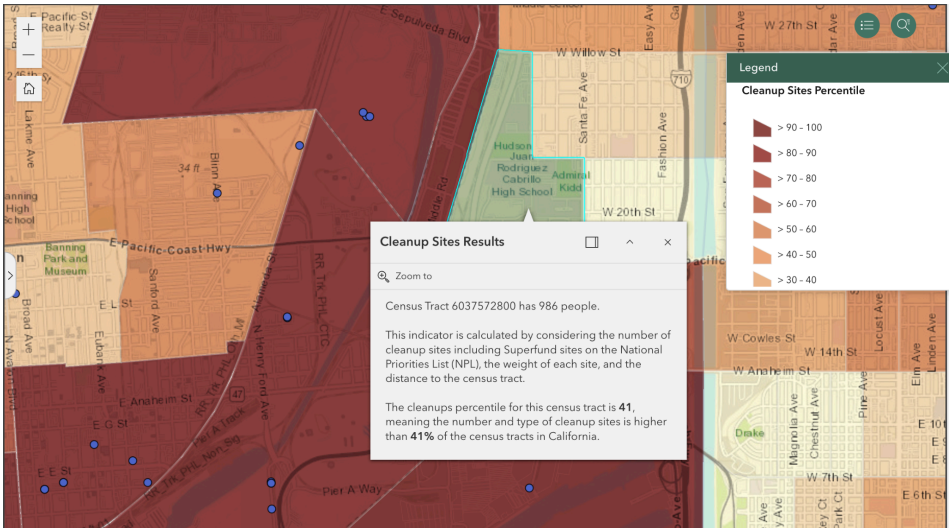

Figure 24: Cleanup Sites
Caption: Although the number of clean up sites is low compared to the neighboring areas, the effects of the other areas affect Cabrillo high school. As well as being worse than 41% of sites in California (Screenshot by Justin Le, Feb 1st 2024)
Source: Cal Enviro

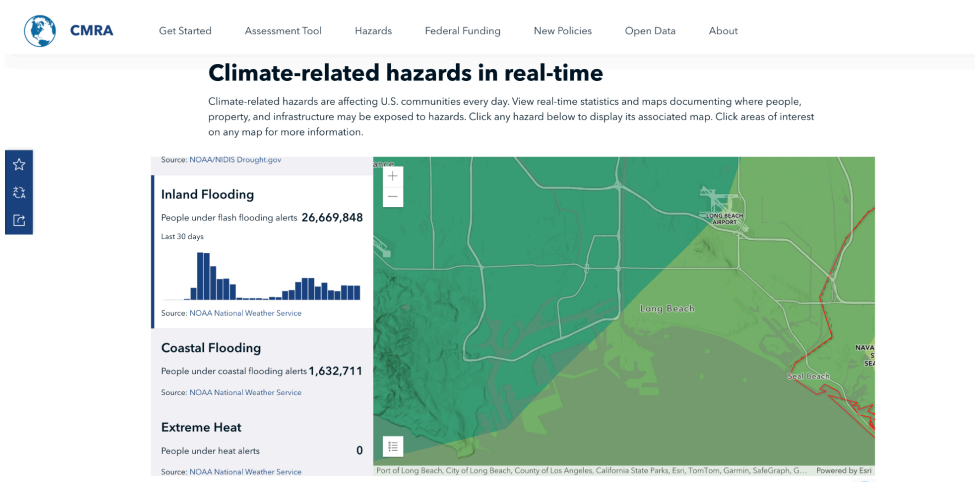

Figure 25: Current Climate Disasters
Caption: Overall, the major Long Beach Area has had coastal flooding advisory with around 27 million people under flash flooding alerts in the past 30 days. In other categories, there were minimal alerts and advisories, with some(around 26 thousand) extreme cold warnings, and little amounts for extreme heat warnings and wildfires. However, around 1 million warnings have been issued for coastal flooding, and 26 million for inland flooding, demonstrating an increasingly extreme list overtime. Drought is also a current issue at a rate of around 33 million. (Screenshot by Sarah Hentges, January 25, 2024)
Source: https://resilience.climate.gov/

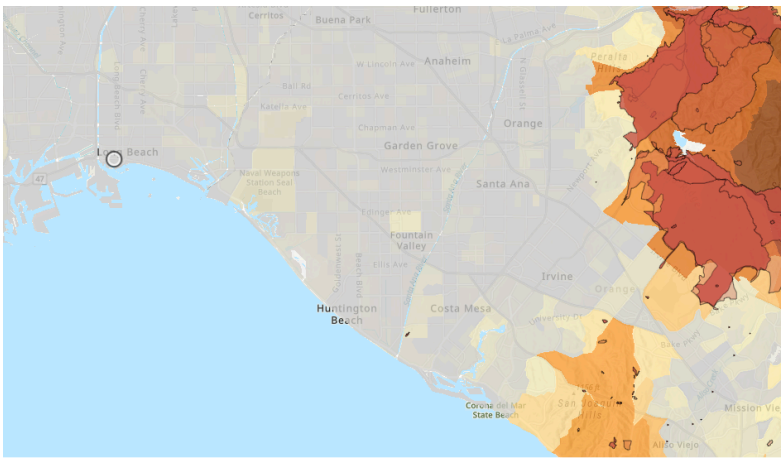

Figure 26: Wildlife Risk and Historic Wildfires
Caption: Long Beach is highly urbanized, meaning its risks for wildfires is low. But, there has been a history of wildfires to the east of the city. As a result, smoke from the east can carry over into the city, decreasing air quality. (Screenshot by Johnson Nguyen, Jan. 25, 2024)
Source:
https://ucirvine.maps.arcgis.com/apps/instant/basic/index.html?appid=64ab0d098c6b4c858e2dd773ae5293f5

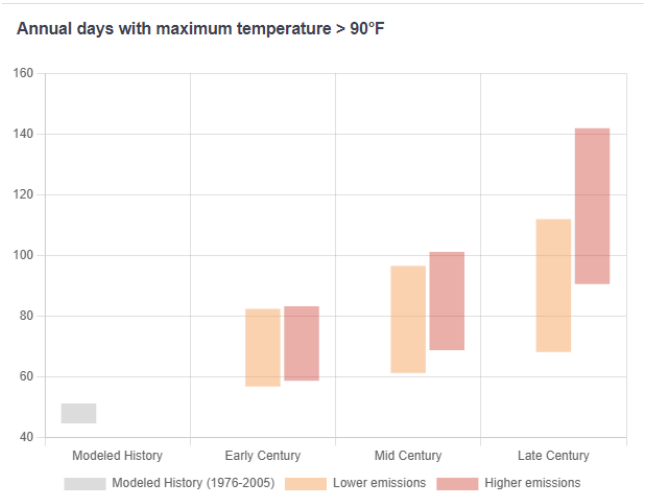

Figure 27: Extreme Heat Projections
Caption: Historically, Long Beach has had just over 50 days annually with temperatures over 90 degrees. Over the next century, this could rise to as much as 140 days if emissions are not reduced. If emissions are reduced, days with temperatures over 90 degrees will lower to just past 110 days. It's still a lot, but it's better than 140+ days. (Screenshot by Johnson Nguyen, Jan. 25, 2024)
Source: https://livingatlas.arcgis.com/assessment-tool/explore/map

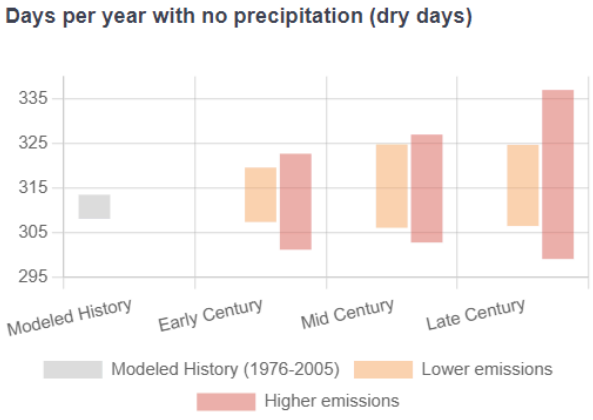

Figure 28: Drought Projections
Caption: Historically, Long Beach has had around 308 days per year with no precipitation. High emissions could increase this to as many as 337 days by the end of the century. (Screenshot by Jay Chan, January 25th, 2024).
Source: https://livingatlas.arcgis.com/assessment-tool/explore/map

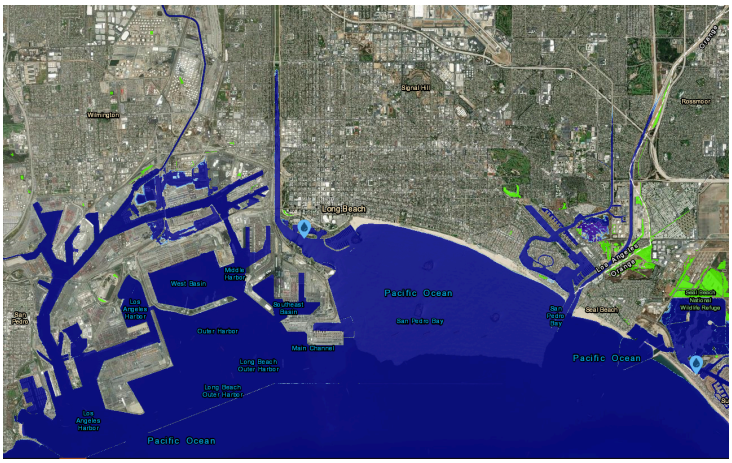

Figure 29: Sea Level Rise
Caption: Orange County and LA County will experience some sea level rise. Since Long Beach is right next to the sea, its communities will be affected by sea level rise. (Screenshot by Johnson Nguyen, Jan. 25, 2024)
Source:
https://coast.noaa.gov/slr/#/layer/slr/1/-13166927.638400134/4015683.0881438428/11/satellite/none/0.8/2050/interHigh/midAccretion

3. COMPOUND VULNERABILITIES

Disproportionately Affected Groups to the Various Types of Pollution

Ritvik Suraparaju

People that live near Juan Rodriguez High School are especially vulnerable to multiple types of pollution that is persistent in Long Beach, and are shown a variety of injustice cases. First off, it is worth mentioning the fossil fuel industry. The historical entrenchment of the fossil fuel industry in Long Beach has greatly shaped the city's identity and economic structure. This has cultivated into a great dependence on oil money, as stated by Flores: "Oil money made Long Beach what it is today, vaulting... into a formidable metropolis" (Flores 2022). Health disparities have emerged, with communities near refineries, like West Long Beach, experiencing higher rates of respiratory issues, asthma, and reduced life expectancy (Flores 2022). Deep financial ties between the industry and various institutions have made it very difficult to address the harmful emissions from fossil fuels, presenting a case of economic and procedural injustice, where these rich companies can decide if they want to cut down on fossil fuel burning (Jaussen 2024). The citizens of Long Beach do not have much power towards forcing the reduction of these fossil fuel related emissions. Another prevalent type of pollution has to do with ports. People in the closest vicinity to the port are mostly "low-income and people of color," and

these neighborhoods are the most affected in the city (Hutchings 2022). Given that Cabrillo High School is near a port, we can clearly see that certain races and ethnicities are much more vulnerable to the adverse effects of port-related pollution. This is clear racial injustice, as these ports (and its related plants) were purposely built near these groups, who are specifically people of color (Hentges 2024). Furthermore, when it comes to air pollution, more than half of the people exposed to Long Beach air pollution include Latino people, while roughly more than a third consist of Asian American or African American people (Unzueta 2022). The government and corporations behind the products of air intentionally chose to place them in minority-dense communities with high populations, showing a case of racial injustice (Chan 2024).

There are also clear-cut failures by the city of Long Beach. Poor city planning, wealth differences, and limited access to healthcare have disproportionately impacted minority groups. Latinos and African Americans are disproportionately likely to live near dangerous pollution levels, and their high rates of poverty make it tough for them to vacate these areas (Orozco 2021). There is more racially motivated injustice in the fact that these problems are more inescapable for certain races. Also, there is health injustice in the sense that certain people are left out of healthcare plans (Varela 2024). Adding to the failure of poor city planning, the road planning was poorly thought out. Diesel particulates, sourced from trucks, cars, and railroads cause air pollution in traffic, especially in heavily used roads. Usually, older trucks produce more emissions, as they're not equipped with modern particle filters. This further worsens the state of air pollution (Cone 2014). Cabrillo High School is near a heavily used highway, meaning that residents near the school are more vulnerable to the adverse effects of vehicle traffic pollution (Nguyen 2024). Additionally, unhealthy management of the waters has led to high pollution and lenient guidelines have only led the pollution to worsen. The government is negligent in their management of the water of Long Beach residents and residents near Cabrillo High School.

What specific health effects are residents near the school more vulnerable to? The asthma rate near Cabrillo High School is measured 85th percentile CA (Asthma Results

2015-2017), the cardiovascular disease rate near Cabrillo High School: 91th percentile CA (Cardiovascular Disease Results 2015-2017), and the percent low birth weight near Cabrillo High School: 95th percentile CA (Low Birth Weight Results (2015-2017). These increased rates of asthma, cardiovascular disease, and low birth weight, are likely due to elevated rates of pollution. These people in these polluted areas are therefore disproportionately more likely to have these complications/diseases, exhibiting yet another case of health injustice (Raman 2024). Moreover, when it comes to mental health, many adults experience anxiety and depression within the city. American Indian adults face the highest rate of severe mental health illnesses compared to other races ("Developing a Robust" 2023). Apart from certain races being disproportionately affected, mental health challenges, and lack of help towards these challenges, impacts one's ability to afford and maintain a proper home, increasing homelessness rates within Long Beach, showing how certain races are more vulnerable.

The unemployment percentile near Cabrillo High School is the 99th percentile. To the east of the school, where there is a living community, unemployment is at the 83rd percentile. This school and its surrounding living area is essentially very high in unemployment (Unemployment Indicator Results 2015-2019). Unemployed often cannot afford to avoid an area with less pollution and environmental hazards. As a result of that, they are forced to face massive amounts of pollution from vehicles and ports, making them disproportionately vulnerable. When it comes to the education level, greatly correlated with unemployment, the rate of adults without a high school education is in the 65th percentile, and this school possesses a low rate of college graduates, with students with a bachelor's degree at just the 19th percentile (Nguyen 2024). A lack of knowledge indicates a great possibility that residents are not completely aware of the pollution in Long Beach and Cabrillo High School, meaning that they wouldn't know that their various health issues like asthma, increased cancer rates, lung disease, all originate from the local refineries and ports; this case can be classified as epistemic injustice where people lack the knowledge regarding pollution to make educated decisions. People near Cabrillo High School would therefore be more vulnerable to pollution due to a lack of proper education

systems and schooling.

When it comes to impoverished communities, or ones that are struggling with making ends meet, there are certain areas with high levels of poverty: as much as 40% of residents within those areas (Income Below Poverty Level 2021).

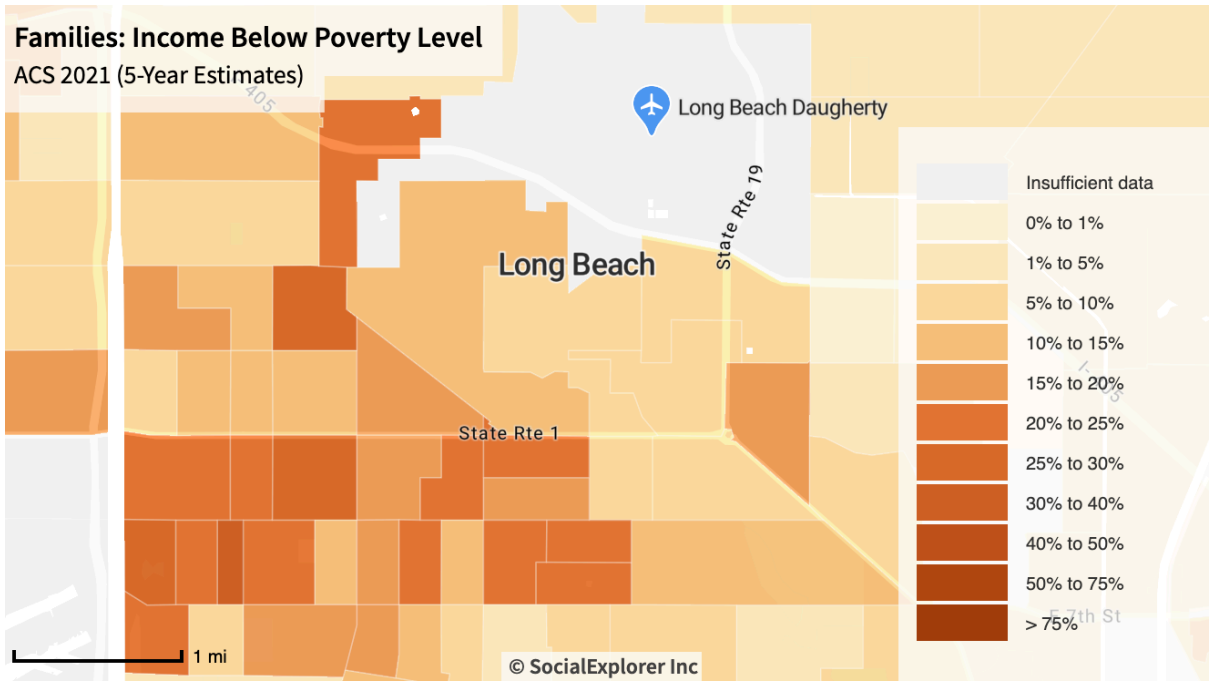

Figure 30: Poverty Rates
Caption: The majority of long beach families have low to medium amounts of income below poverty level, however in particular areas, there are higher rates at up to 40%. Although poverty isn't a major issue in this area, there are still a variety of families and areas in the long beach region that struggle with a lower income, opening the opportunity to increase poverty rates over time. (Screenshot by Sarah Hentges, February 1, 2024)
Source: https://www.socialexplorer.com/912c1dae1b/view

Additionally, 48.8% of all residents surrounding Cabrillo High School are experiencing high rent burden (Over 30 Percent 2022).

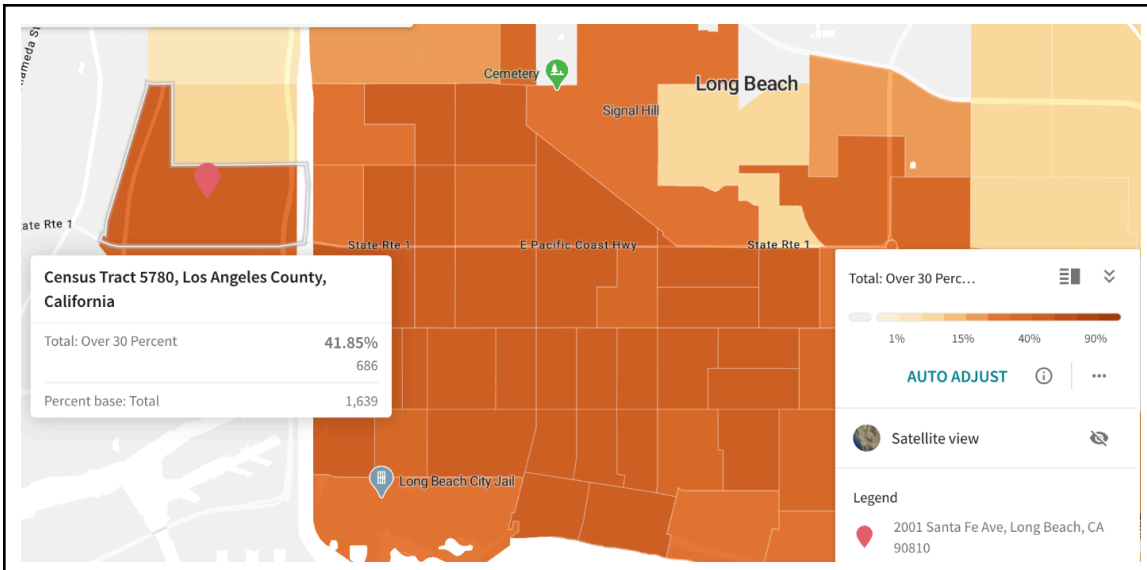

Figure 31: Rent Burden
Caption: 48.8% of residents surrounding Cabrillo High School are experiencing rent burden. (Screenshot by Jayden Villagrana, January 25, 2024).
Source: https://www.socialexplorer.com/a9676d974c/explore

Essentially, a variety of families still struggle with poverty, meaning that poverty could become more severe. In terms of vulnerabilities, the impoverished families have less of an opportunity to avoid the pollution in Long Beach. Rent burdened people are predominantly Black and Latino, and households surveyed in the Spanish language were more likely to be in rent burden than surveys in the English language(Rosen et al. n.d.). This shows the economic injustice within Cabrillo High School, as the uneven distribution of wealth and poverty among the races makes certain groups of people more likely to experience the adverse effects of various types of pollution.

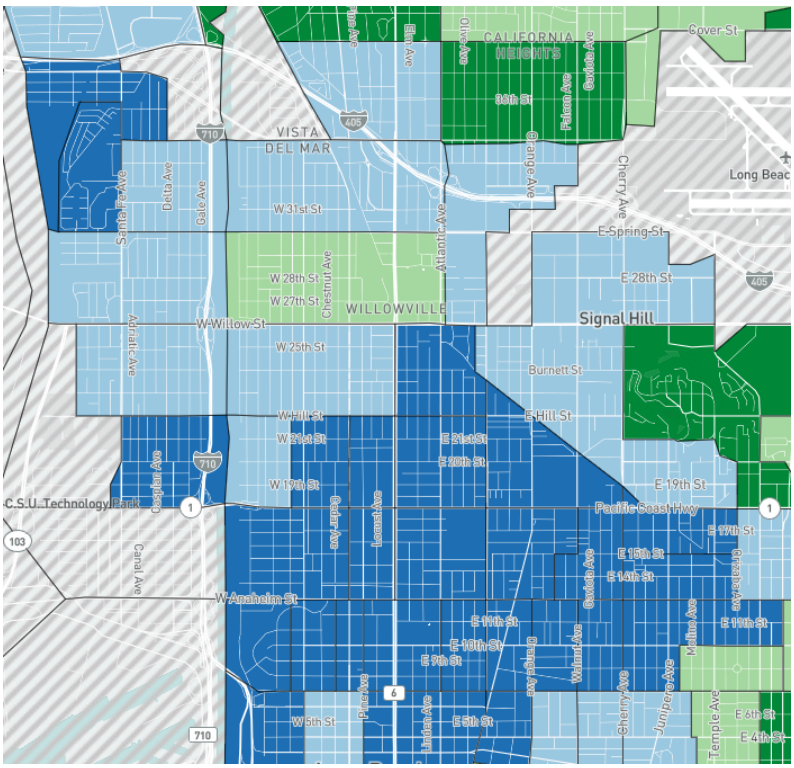

Figure 32: California Healthy Places Index
Caption: North Long Beach comparatively has a lower HPI than East Long Beach, likely due to the difference in the poor hispanic communities and the wealthy, white communities. The census tracts generally performed poorly on the economic, social, housing, and healthcare access. It's less healthy to live in compared to the rest of the county. (Screenshot by Kayley Frias-Ceballos, January 27, 2024)
Source: https://map.healthyplacesindex.org/

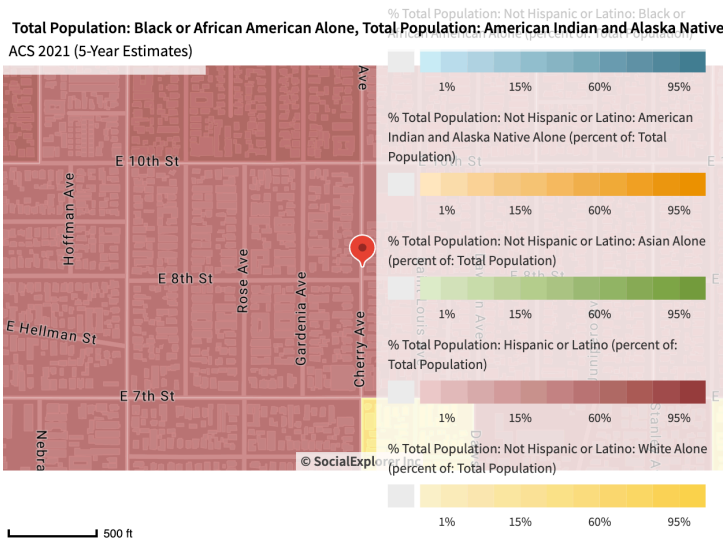

Figure 33: Racial Demographics
Caption: Long Beach is a majority Hispanic or Latino city. (Screenshot by Sarah Hentges, February 1, 2024)
Source: https://www.socialexplorer.com/a9676d974c/explore

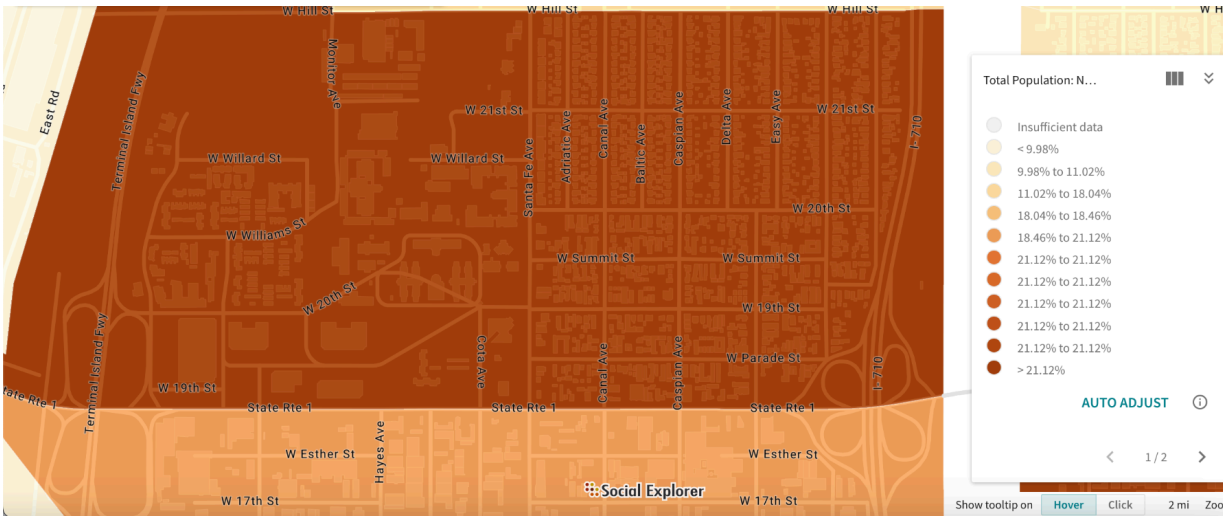

Figure 34: Citizenship Rates
Caption: The map below shows that Long Beach has a high amount of foreign born/non citizen residents. In the area surrounding Cabrillo High School, there is a total population of 21.12% residents that are foreign born/not a citizen. (Screenshot by Jayden Villagrana, January 25, 2024).
Source: https://www.socialexplorer.com/a6942b9b3c/view

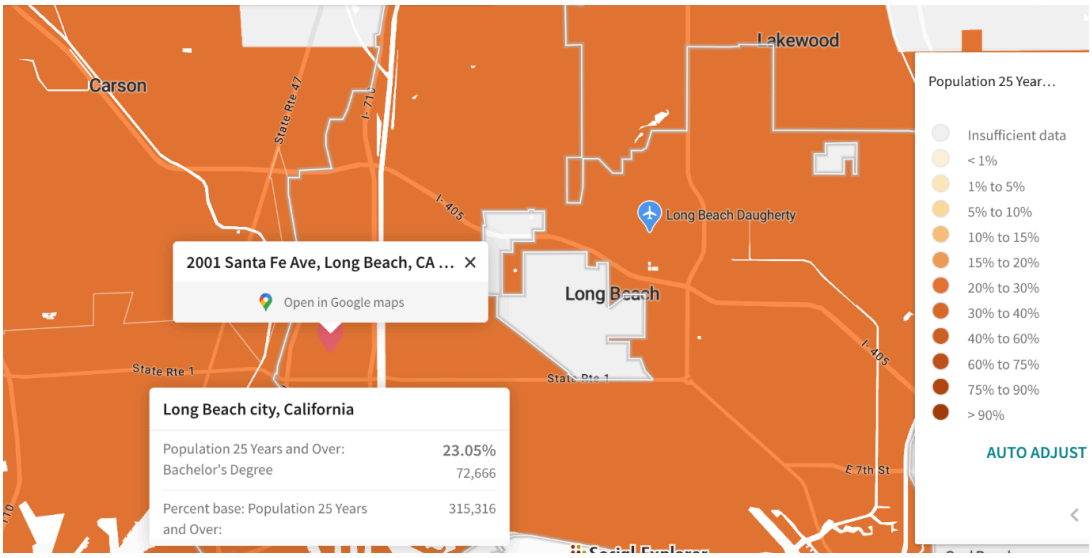

Figure 35: Educational Attainment
Caption: In Long Beach 23% of the population 25 years or older has a Bachelor's Degree. (Screenshot by Jayden Villagrana, January 25, 2024).
Source: https://www.socialexplorer.com/a9676d974c/explore

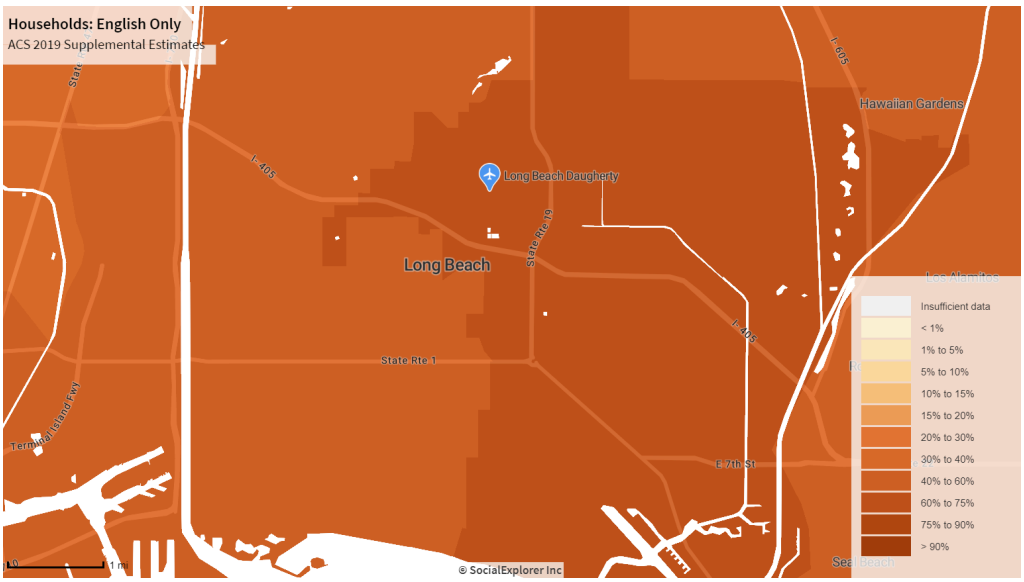

Figure 36: Linguistic Isolation
Caption: The city of Long Beach has approximately 40% of the population who only speaks English. (Screenshot by Kayley Frias-Ceballos, February 29, 2024).
Source: https://www.socialexplorer.com/a9676d974c/explore

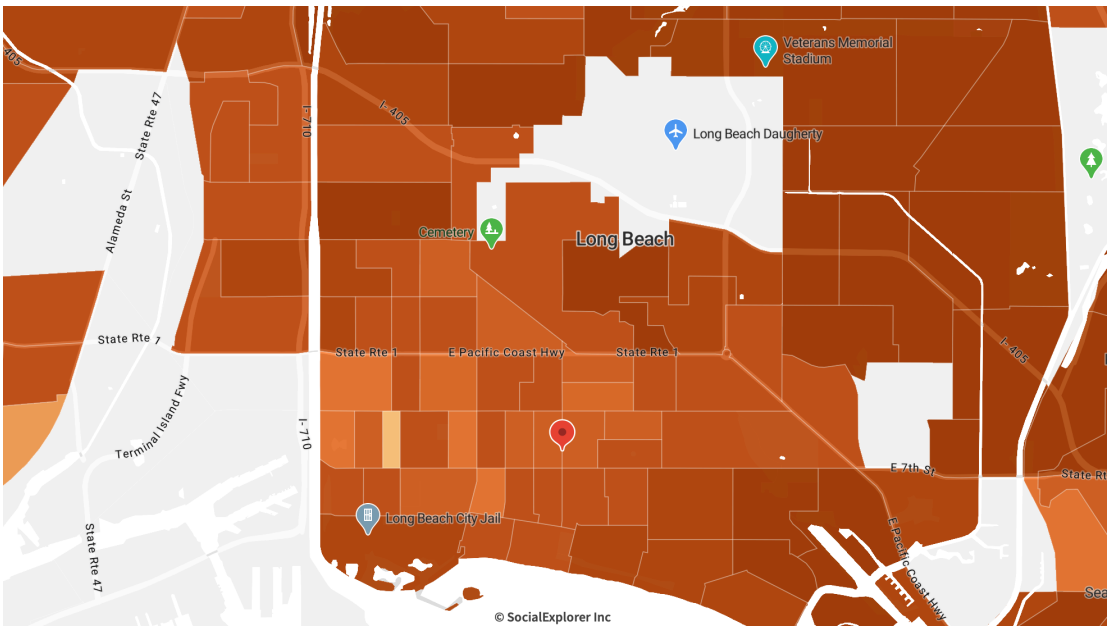

Figure 37: Income Rates
Caption: In part of Long Beach, the average median household income in 2021 was between $40,000 - $50,000. The highest average to $106,000 a year to the lowest averaging $26,000 a year (Screenshot by Jocelyn Varela, February 08, 2024).
Source: https://www.socialexplorer.com/a9676d974c/explore

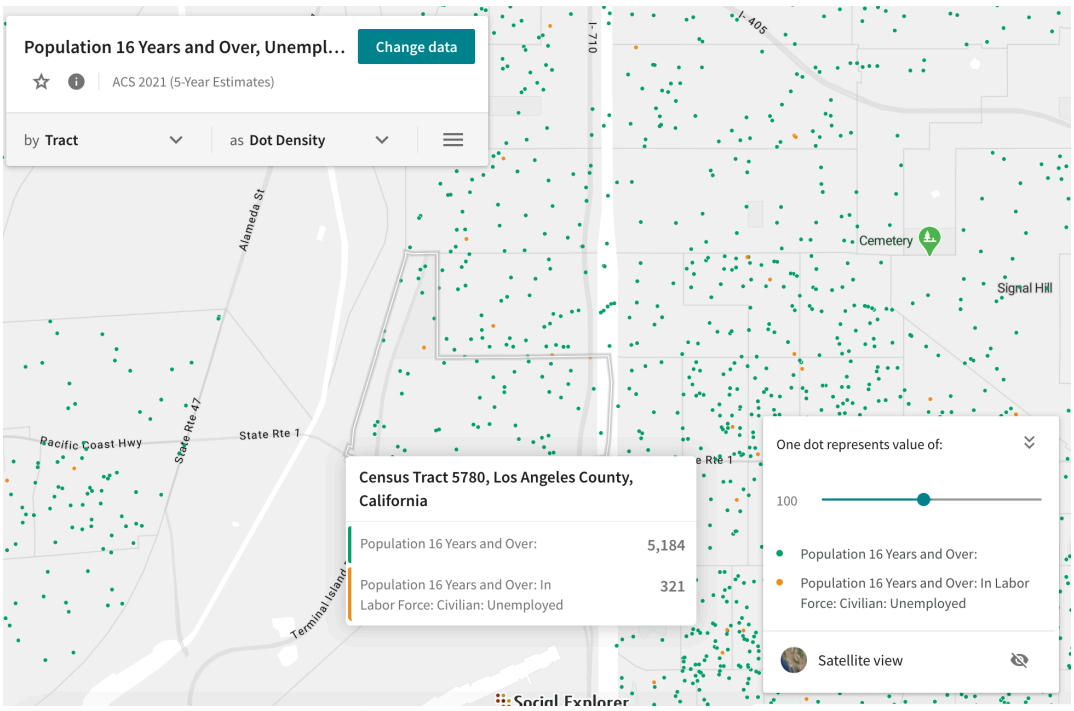

Figure 38: Unemployment Rates
Caption: In Long Beach, specifically near Cabrillo High School, there are 321 people over the age 16 who are unemployed. (Screenshot by Jayden Villagrana, January 25, 2024).
Source: https://www.socialexplorer.com/a9676d974c/explore

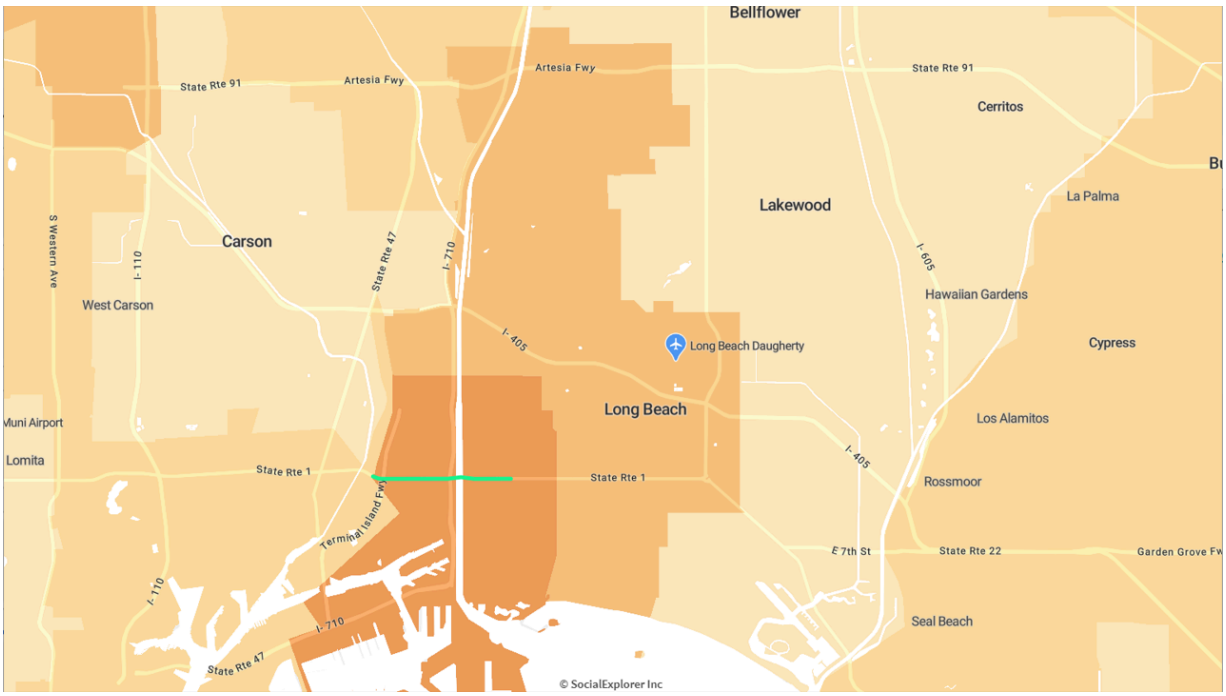

Figure 39: Vehicle Access
Caption: 10.33% of Long Beach households do not have access to a vehicle (Screenshot by Ritvik Suraparaju, January 25th, 2024).
Source: https://www.socialexplorer.com/a9676d974c/explore

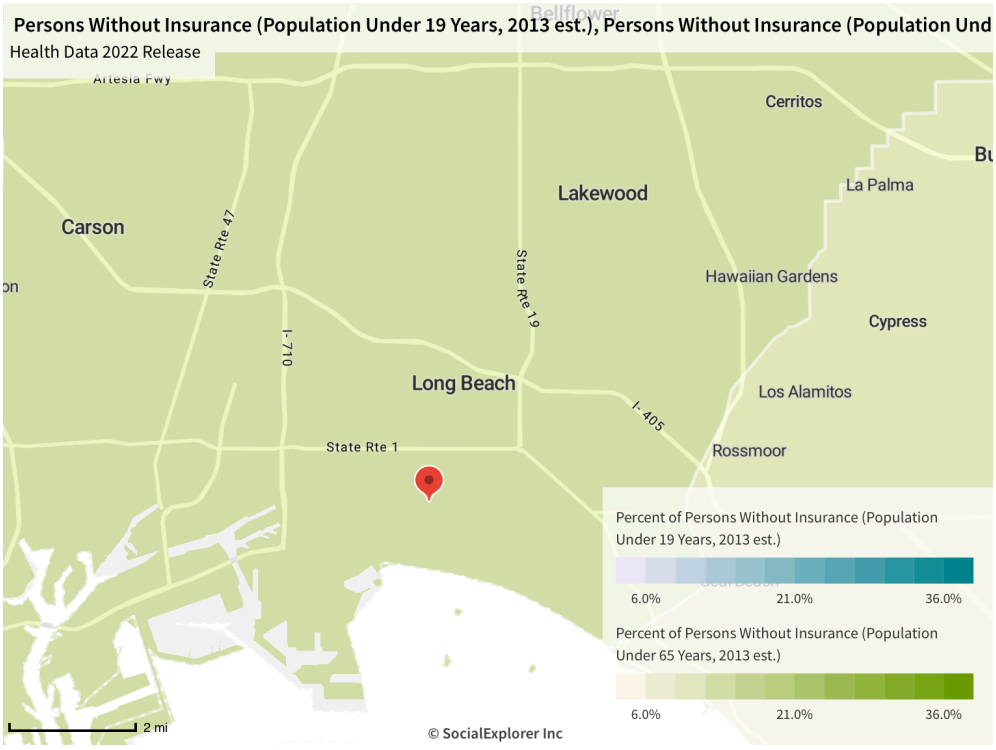

Figure 40: Health Insurance
Caption: Long Beach has fairly high health insurance coverage. Less than 6.0 of students at Cabrillo High School's Census tract do not have health insurance. (Screenshot by Kayley Frias-Ceballos, January 24, 2024).
Source: https://www.socialexplorer.com/a9676d974c/explore

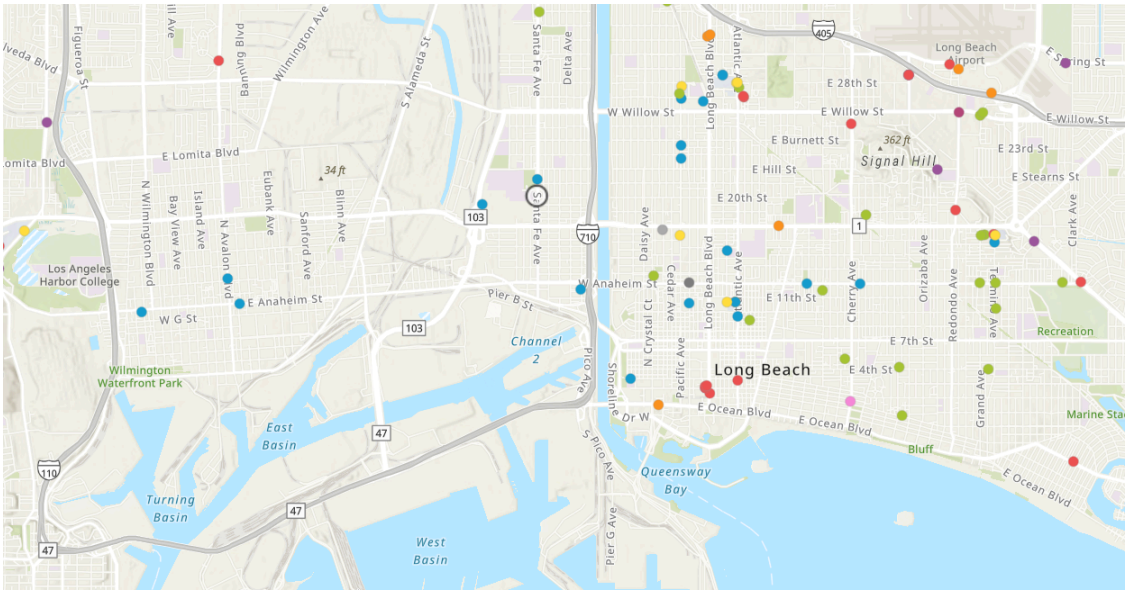

Figure 41: Healthcare Facilities
Caption: Long Beach has a lot of healthcare facilities in the main areas of the city. They are primarily on the eastside of Long Beach. Their closest healthcare facilities to Cabrillo High School are The Children's Clinic Family Health Center Westside and Cabrillo Gateway. (Screenshot by Jay Chan, February 1st, 2024).
Source:
https://ucirvine.maps.arcgis.com/apps/instant/basic/index.html?appid=95c9abe0acbe438a8b6d7d3cd3c200a9

4. STAKEHOLDER ANALYSIS

Main Stakeholders

Justin Le

Stakeholder Group #1: Marathon Petroleum Group

The Marathon Petroleum Group was founded in 2009 in Finley, Ohio. They have expanded their operations nationwide, making a refinery in the Long Beach area. The Marathon Petroleum group is in charge of refining oil, and the marketing and distribution of their product. First, The group is a petroleum business, a product everyone needs to power their cars, heat homes, and produce plastics. Their main motive is to provide their product to their consumer's demands and create revenue from it. Like many oil companies, they also have a large amount of carbon emissions that cause concerns for the environment and the residents who live nearby. Due to government environmental regulations such as the Clean Air Act, the company has to adhere to the regulations forcing them to not produce as much product as they desire. In addition to the government restricting them, accidents are also a major problem for the company. “In 2016, a fire at the Galveston Bay refinery in Texas City, Texas, injured three contract workers, resulting in a lawsuit seeking $1 million in damages. Multiple lawsuits were filed resulting in Marathon paying $86 million to settle” (Wikipedia 2024) The fire serves as a lesson to the Marathon Petroleum Group, with one small mistake it will cost the lives of the residents harming the company.

Stakeholder Group #2: Students of Long Beach

The students of Long Beach are residents of Long Beach, specifically the younger generation. They pursue an education to learn, get jobs, and provide for themselves and others. The students of Long Beach, especially the students of Cabrillo High School, are near the Marathon Petroleum Company's oil refinery. According to the California Healthy Place Index, Cabrillo High School is in the 3.7th percentile of a healthy community. This means that the Cabrillo High School area is healthier than 3.7% of all California communities. The students are enabled by the California government's requirement for kids under the age of 18 to pursue an education (Legislative Analyst Office, 2024), as well as the desire to live a successful life. Although the desire exists, due to air pollution, students are experiencing health issues. A student at Cabrillo High School, Diego Mayans, acknowledges that the air pollution caused by the oil refineries near Cabrillo High School is giving headaches and nosebleeds (Flores, 2024). Like many other students at Cabrillo High School, they just want to live their lives healthily without the effects of air pollution impacting their future.

Stakeholder Group #3: Parents of Long Beach

Similar to the student population of Long Beach, the residents, particularly the older generation, play a crucial role in the community. Unlike students, these individuals are often parents or guardians, responsible for providing for their families. They ensure their loved ones have essential needs met, including housing and food. Many of them hold jobs, with positions spanning from workers to managerial roles, often employed by companies like Marathon Petroleum. The jobs are what enable them to provide for their family as well as their mental health and well-being. Without stable employment, they face significant challenges in meeting their family's needs, which can have repercussions on both their health and the well-being of their children.

Stakeholder Group #4: Environmental Groups

Environmental groups are organizations dedicated to advocating for environmental protection, conservation, and sustainability. Operating at local, national, and international

levels, they address a wide array of environmental issues, including climate change, pollution, deforestation, habitat destruction, and biodiversity loss. Take, for example, East Yard Communities for Environmental Justice, a local organization committed to empowering communities in decision-making processes that directly affect their health and quality of life (East Yard Communities, 2024). While primarily focused on local initiatives, their impact is significant within their communities. Through building connections with residents and collaborating with other organizations, they effectively amplify their influence, driving positive change at the local level. In addition to East Yard Communities for Environmental Justice, another notable organization is the Coalition for Clean Air. This organization has been dedicated to monitoring air quality not only in the Long Beach area but throughout California since 1971, with a primary focus on safeguarding public health, improving air quality, and mitigating climate change. As stated by the Coalition for Clean Air, their mission is to "protect public health, improve air quality, and prevent climate change since 1971." Unlike East Yard, the Coalition for Clean Air operates at the state level, exerting influence on environmental policy and initiatives across California. What enables them to fight for the environment is the 1st Amendment from the U.S. government, because of the government they have a right to protect and free speech to talk about the environment getting more followers. However, what corrodes them is private companies advocating for more of their business to make more products thus adding more air pollution.

Stakeholder Group #5: California State Government

The United States government, founded on democratic principles, comprises three branches: executive, legislative, and judicial. Led by the President, the executive branch enforces laws and manages federal agencies. Congress, consisting of the Senate and the House of Representatives, is responsible for legislating, taxing, and overseeing the budget. The judicial branch, headed by the Supreme Court, interprets laws and resolves disputes. Together, these branches uphold the Constitution and govern the nation, while federal agencies implement policies and programs to serve the American people. Within the

framework of the U.S. government, individual senators as well as the House of Representatives play critical roles in shaping legislative decisions and representing the interests of their constituents at the state level. For example, Lena Gonzalez, California's senator, served "on the Long Beach City Council from 2014 to 2019" (Lena Gonzalez, Wikipedia, 2024). Lena Gonzalez is just one of many senators and representatives who also support the need for environmental regulation to fix the environment. What enables them to pass legislation is power and influence through the government system. They have equal influence to the voting decisions thus have a chance to change laws to better their needs. The corrosion is that there is a limit to that power as the other branches of the government such as legislative and judicial stop them from passing too much legislation without proper checks and balances.

Stakeholder Power Grid		
What empowers this stakeholder?	**Stakeholder**	**What disempowers this stakeholder?**
Consumers	Marathon Petroleum Group	Government regulations and accidents
Education, desire to learn	Students of Long Beach	Limited Knowledge
Provide for family	Parents of Long Beach	Capitalism
Desire for change	Environmental Groups	Limited influence
Authority over citizens	US Government	Other Branches of Government

Figure 42: Native Peoples
Caption: This picture captures a modern representation of the Tongva (Gabrieleno) tribe who were displaced from their sacred land and spaces in LA county (reside partially in Long Beach). (Screenshot by Jay Chan, February 8th, 2024).
Source: https://www.arcgis.com/apps/MapJournal/index.html?appid=a9e370db955a45ba99c52fb31f31f1fc#

5. STAKEHOLDER ACTIONS

Resiliency of the Long Beach Community

Kayla M. Jaussen

Long Beach, California, grapples with severe challenges from toxic air pollution, largely attributable to industrial activities such as oil refineries, port operations, and traffic diesel. Despite these challenges, various stakeholders in the community have undertaken actions aimed at addressing the pressing issue for the Long Beach Community. Stakeholders such as oil refinery workers, residents, community organizations, schools, and protective services have all played a pivotal role in advocating for cleaner air and implementing solutions to help mitigate pollution and environmental issues. This research will delve into the actions taken by different stakeholder groups in Long Beach to combat toxic air pollution and environmental injustices, drawing insight from community initiatives.

Marathon Petroleum L.A. Refinery:

Oil refinery workers in Long Beach, particularly those employed by Marathon Petroleum Corporation, are intimately familiar with the health impacts associated with refinery operations. This refinery is a significant contributor to the industrial landscape of the region, producing various petroleum products, including gasoline, diesel fuel, distillates, and petrochemicals (Marathon Petroleum Corporation, 2021). Marathon Petroleum has taken proactive measures to mitigate pollution and reduce its environmental footprint. One notable aspect of their environmental stewardship is their commitment to meeting regulatory standards and implementing emissions-reduction initiatives, ensuring compliance with emissions standards set forth by regulatory agencies

such as the California Air Resources Board (CARB) to minimize its impact on air quality and public health. They have invested in technologies and practices aimed at reducing greenhouse gas emissions and other pollutants emitted during refinery operations, including efforts to reduce nitrogen oxide (NOx) emissions, a key contributor to smog formation and respiratory ailments (Marathon Petroleum Corporation, 2021). They continue to stay committed to minimizing their impact on the environment by staying involved with many organizations to protect local communities. As of now, Marathon Petroleum has reduced emissions by more than "75% from seven years ago", has worked with local air agencies to install fence line air monitoring systems, funded school programs, and resources, and has received recognition awards such as the Safety Achievement Award and the L.E.E.D award (Marathon Petroleum Corporation, 2021). As of Spring 2020, Marathon's Community Newsletter acknowledges its dedication to bettering its local communities. During the COVID-19 crisis, Marathon Petroleum deployed thousands of personal protective equipment across many states and local medical facilities and donated $1 million to the Red Cross to combat the devastation of COVID-19 (Marathon Petroleum, 2020). They also serve their local schools to prepare them for a better future. Looking specifically at Cabrillo High School, Marathon Petroleum has funded its STEM program to have access to advanced technologies. They want to positively impact their community and be a good neighbor to their local schools.

Port Authorities and Community Grants Program:

The Port of Long Beach has been proactive in addressing environmental concerns by implementing measures to reduce pollution from port operations. Through initiatives such as the Climate Adaptation and Coastal Resiliency Plan (CRP), the port aims to manage the risks associated with climate change and coastal hazards (Port of Long Beach, 2016). Additionally, the port has invested in emission-reducing technology and supported sustainability projects within the community. For instance, the port has funded air filtration systems in nearby schools and supported the creation of a mobile care clinic known as the St. Mary Medical Center to address health issues related to air pollution in impacted communities. This program is involved in the Community Grants Program which

was created by Matt Arms. This program was dedicated to improving water quality and worked towards eliminating truck pollution by enforcing more smog checks, and is dedicated to creating new technologies so Long Beach can become the first "zero-emissions" port. (Munguia, 2021). To also reference a discussion post from question 5, "Stakeholder Actions and Inactions", it was also acknowledged that the Port of Long Beach is greatly trying to reduce certain types of pollution in their area such as diesel, oxides, and sulfur oxides, including congested pollution that was caused during the Covid pandemic, and proposed to receive $ 225 million in grants to fund towards reducing toxic emissions from the port (Suraparaju, 2024). These efforts underscore a commitment to environmental stewardship and community well-being.

Local residents, activists, and City Council:

Local residents and environmental groups in Long Beach have been actively involved in advocating for cleaner air and addressing environmental injustices. The Office of Youth Development, for example, has implemented a Youth Participatory Budget program to empower young people to propose and vote on projects aimed at improving community health and sustainability. Their strategic planning is adopted in a five-year plan known as the "Long Beach Youth and Emerging Adults Strategic Plan (YSP) allowing young individuals from 8 to 24 to ensure productive leadership skills and resources to contribute to their community (Office of Youth Development, n.d.). These young people are given a chance to decide where public funding goes. Also understanding that Long Beach is predominantly Latino and many other minority groups are being disproportionately impacted. These communities have faced higher risk of asthma, lower life expectancy, and pollution-related illnesses (Flores, 2022). The Long Beach City Council has approved "Racial Equity and Reconciliation Initiatives" which recommends decreasing industrial pollution in impacted communities of color, allowing fair access to green safe jobs, and increasing production of locally and healthy sourced foods in underserved areas (Munguia et al., 2021). Even local residents have spoken up in interviews about their health effects due to exposure to air pollution from nearby ports. And climate activists are starting to take charge to protest against air pollution. For example, 50 environmental activists

constructed a “die-in” protest by lying down in the parking lot in front of a target to signify a shorter life expectancy caused by air pollution. Their message was to protest major retailers such as Target, Amazon, Walmart, and many others to end or minimize major shipped pollution from the Ports (Hendrickson, 2022). With this grassroots approach to engage local residents and involve the power of the City Council, they can effectively foster a sense of ownership and responsibility towards environmental issues.

Long Beach Fire Department:

The Long Beach Fire Department faces challenges in providing adequate emergency services amidst increasing population growth and underfunded facilities. However, efforts have been made to modernize fire stations and equipment to improve efficiency and sustainability. For instance, the department has explored the feasibility of replacing outdated fleet vehicles with environmentally friendly alternatives and implementing green building practices in station construction (City of Long Beach, n.d.). The Long Beach Fire Department's Bureau of Fire Prevention is dedicated to reducing fires and burn injuries through prevention, emphasizing protection, education, and action. Top management, including Fire Chief Dennis Buchanan and Fire Marshal Robbie Grego, enforces fire codes and ensures compliance with federal, state, and local laws to protect lives and property (Long Beach Fire Department, n.d.). Fire inspectors receive specialized training to identify and address safety hazards, such as blocked exits, to enhance public safety and firefighter effectiveness. All Long Beach firefighters are certified as Emergency Medical Technicians (EMTs) and address reported fire hazards within their neighborhoods, demonstrating a commitment to safety (Long Beach Fire Department, n.d.). The department emphasizes code enforcement to protect citizens, businesses, and visitors, conducting regular inspections to ensure compliance with fire codes throughout the life of structures. Plan check personnel ensure adherence to fire and life safety requirements in building design and construction, contributing to fire safety in various occupancies, including high-rise developments and hazardous materials storage warehouses (Long Beach Fire Department, n.d.). Special event inspections are conducted to verify compliance with safety regulations, ensuring the safety of participants and

emergency access for first responders. Fire permits track high-risk processes and services, with required annual inspections outlined in the fire code to ensure safe use. Environmental control staff oversee the use, storage, and release of hazardous materials, addressing challenges posed by rapid advancements in the chemical industry (Long Beach Fire Department, n.d.). Fire/arson investigation is conducted by specially trained firefighters with peace officer status, aiding in the identification and prosecution of arson-related crimes, a major cause of deaths, injuries, and property loss nationwide (Long Beach Fire Department, n.d.). The Office of Public Education develops and supports fire and burn safety education efforts, particularly targeting children and older adults who are at greater risk. The Long Beach Fire Ambassador Program, launched in 1991, utilizes specially trained volunteers aged 55 or better to educate third-grade students in the Long Beach Unified School District about home fire and burn safety, furthering the department's public education initiatives (Long Beach Fire Department, n.d.). Through these comprehensive efforts, the Long Beach Fire Department aims to prevent fires, reduce burn injuries, and protect the community's well-being. These initiatives not only enhance emergency response capabilities but also contribute to reducing the department's environmental footprint.

Schools:

Schools play a vital role in educating future generations about environmental issues and promoting sustainable practices. In Long Beach, efforts have been made to incorporate environmental education into the curriculum and reduce the carbon footprint of school facilities. Additionally, teachers and students have been actively involved in raising awareness about environmental injustices and advocating for cleaner air in their communities (Nguyen, 2024). Schools, students, and teachers in Long Beach are taking proactive measures to address toxic air pollution and mitigate its impact on the community. Despite receiving donations from fossil fuel companies like Chevron and California Resources Corporation, educational institutions such as the Long Beach Unified School District (LBUSD) are actively working to combat environmental challenges (Flores, 2022). Recognizing the growing threat of climate change and its detrimental effects on

student health and well-being, LBUSD has implemented various initiatives to reduce energy and water consumption and maximize the use of renewable and clean energy technologies (Long Beach Unified School District, 2019). These efforts include ensuring that new construction and renovation projects comply with green building standards, with a specific focus on zero-emission machinery and facilities modernization projects (Long Beach Unified School District, 2019). Moreover, LBUSD is prioritizing student health by reducing vehicle emissions to campuses and facilities, thereby contributing to improved air quality and mitigating the adverse effects of pollution on student learning and outdoor activities (Long Beach Unified School District, 2019). By implementing sustainable practices and prioritizing environmental stewardship, schools, students, and teachers in Long Beach are actively working towards creating a healthier and more sustainable future for the community. By equipping students with knowledge and skills to address environmental challenges, schools empower them to become agents of change in their communities.

In conclusion, various stakeholder groups in Long Beach are taking proactive measures to combat toxic air pollution and promote environmental sustainability. From oil refinery workers to local residents, firefighters, schools, the city council, and environmental organizations, each group can play a vital role in advocating for cleaner air and implementing solutions to mitigate pollution. By working together and engaging in collaborative efforts, stakeholders can create a healthier and more sustainable environment for current and future generations.

6. NEWS, SCIENCE, DEBATE

Unveiling Media Realities in Long Beach

Kayley Frias-Ceballos

As to the setting, media assets are to play a crucial role in disseminating information on the environmental issues, in the port of Long Beach and the surrounding areas around the neighborhood. The assets addressed are various forms of media such as news reports, articles, and data analysis provided by organizations and government agencies. Additionally, advocacy groups and environmental organizations contribute to raising awareness and providing solutions to mitigate environmental problems. In other words, media assets are a platform that highlights the impact of industrial activities, such as container shipping and refinery operations, air quality, and public health. Additionally, some of the things they provide are data-driven insights into pollution levels, emission rates, and regulatory compliance, enabling stakeholders to assess the severity of environmental issues. For instance, reports from the American Lung Association (ALA) offer valuable information on air quality metrics, recommending measures to reduce pollution and protect public health (ALA 2022).

For instance, Government agencies like the U.S. Environmental Protection Agency (EPA) contribute to media assets by collecting and publishing data on refinery emissions and air quality monitoring. These reports inform the public about regulatory efforts and the effectiveness of pollution control measures (Hentges 2024). However, there are notable incapacities in media coverage and data dissemination regarding environmental problems in this setting.

Another significant limitation is the incapacity lies in the lack of comprehensive

reporting on the long-term environmental impacts on industrial activities in the local communities. Some media outlets that are to be highlighted are the immediate concerns for air pollution, spikes, or regulatory violations that are often overlooked in the broader picture of how it impacts public health and the stability of local ecosystems over time. For instance, despite efforts from advocacy groups and government agencies to track air quality and enforce pollution mitigation strategies, it persists of significant knowledge gap in regards to its extent of environmental degradation and its implications for future generations.

In this setting, media incapacities are to have worsened by the restriction of information and support from the communities disproportionately impacted by environmental hazards. The residents in the low-income neighborhoods are predominantly people of color and those who face barriers to accessing accurate data and the inability to participate in decision-making processes. As a result, their voices and concerns may be marginalized in media narratives, perpetuating environmental injustices (Villagrana 2024).

One instance of data divergence is evident in the discrepancy between official reports on air quality improvements and community perceptions of ongoing pollution problems. While government agencies may have highlighted reductions in pollutant emissions and improvements in overall air quality (Hentges 2024), residents and advocacy groups may emphasize persistent health risks and environmental injustices (Varela 2024). The disparity underscores the need for transparent communication and inclusive decision-making processes to reconcile conflicting perspectives and priorities.

Another example of data divergence is how it relates to the portrayal of environmental initiatives and policy interventions in the media coverage. Although government agencies and industry stakeholders may promote projects aimed at mitigating environmental impacts such as park expansions and pollution control measures, putting community perspectives into effect and equity of efforts may vary (Jaussen 2024). Divergent interpretations of data regarding project outcomes and

community benefits can shape public discourse and influence policy priorities.

Furthermore, another factor, discrepancies in data reporting and analysis is to have different organizations and media outlets that can contribute to conflicting narratives about the severity and urgency of environmental problems. For example, while some reports may emphasize progress in reducing pollutant emissions and improving air quality (Raman 2024), others may highlight persistent challenges and disparities in environmental health outcomes (Le 2024). Those divergent narratives influence the public perspective and policy decisions, which undergo the important significance of transparent data sharing and collaborative analysis to foster consensus and informed action.

In conclusion, media assets play a vital role in reporting environmental problems in the given setting, providing valuable information and insights to stakeholders. However, media incapacities, including limited coverage of long-term impacts, disparities in information access, and instances of data divergence, pose challenges to addressing environmental challenges effectively. Addressing these incapacities requires transparent communication, inclusive decision-making processes, and collaborative efforts to reconcile conflicting perspectives and prioritize equitable solutions.

7. RECOMMENDED LOCAL ACTIONS

Long Beach Community - Come Together!

Sarah Hentges

In Long Beach, California, there are a variety of issues that continuously affect both the community's health, the safety of workers and students, and the overall environmental well-being. Diesel PM exposure in the community, hazardous waste, water contamination, greenhouse gas emissions, and refinery explosions and leaks have each shifted the social groups in Long Beach for good, burdening the community with continuous efforts to help minimize the efforts of these long term issues. However, the most prominent issue facing this community is the air pollution emitted by nearby oil refineries and traffic-related emissions, due to its close proximity to the LA and Long Beach ports. The Cabrillo High School area is a hotspot for smog, NOX, etc. and remains one of the most air-polluted areas in California (Ngyuen 2024). These issues affect both students in the Long Beach Unified School District as well as all community members surrounding it, shifting the manner in which they live out their daily lives, and making these issues a prominent concern needed to address not only by larger governmental action, but also by taking action in the local communities in Long Beach Unified School District.

Other Locations and Their Solutions:

In order to address these problems in other locations, a variety of tactics have been utilized. Local action begins with a small group advocating for the community and their personal concerns, and then sparking a larger movement or action throughout the entirety of the community.

One example is the community of Uniontown (Uniontown, Alabama). These people started community meet ups to spread awareness about the issue of pollution in the community, working with universities to increase community involvement and create change. In Uniontown, they worked particularly with Auburn University, working with the mayor to increase awareness and involvement. - "provided assistance to the city of Uniontown, Alabama, by helping to develop and implement its strategic plan – 'Uniontown 2020.' In addition, a Community Development Corporation (CDC) was created as a way to obtain broader public involvement and to provide a structured organization capable of implementing some of the strategic plan's recommendations. Auburn University set out to assess the civic health of Uniontown and to engage the community by creating a representative focus group of residents to deliberate on local issues. Citizens have utilized this new public space to identify and take ownership of community problems." (Participedia, 2019) Connection with these universities and student bodies is an efficient strategy to increase engagement, and therefore, prompt change.

In locations such as Madrid, Athens, and Paris, a shift has begun to occur to help reduce the impact of Diesel PM exposure. "Hybrid vehicles and electric vehicles are getting cheaper and more efficient, meaning that diesel vehicles may disappear sooner than previously thought. Mailers of cities like Madrid, Athens, and Paris have announced their intention to ban the production of diesel vehicles sometime in the future." (Camfil Clean Air Solutions, 2024) This shift is an essential one, as the shift to less oil fueled machines could positively impact both the impact of climate change and the pollution that directly affects citizens daily. In addition to the shift to hybrid or electric cars, the city also must address the individuals required to work in traffic. "Those people that are required to work in traffic are likely to be disproportionately affected by exposure to air pollution, and whilst this has been acknowledged in occupational health studies, a modern exposure science approach on the time-activity of a professional driver has not been applied. There is a clear need for larger experimental campaigns to fully parameterise the level and chief determinants of in-vehicle exposures in occupational drivers." (Laycock, 2021) In order to create a safer work environment for these individuals, community involvement is essential, and member's voice's must be amplified in government spaces.

Solutions to Implement in Long Beach:

In Long Beach, these solutions can be implemented through developing social advocacy groups, reaching out to organizations in the community, helping stand up for their smaller goals at the larger governmental scale, and generating new programs. Starting small can lead to large shifts and change for future generations.

Residents are currently demanding a change through the "Don't Waste Long Beach" campaign, where a coalition of community, environmental, and worker's rights organizations attended a meeting to provide public input and to encourage the commissions to make transforming the Long Beach Waste system a priority in their upcoming Sustainable City Action Plan (Mackenzie Jaussen 2024). This plan works to shift to a franchise system for waste and recycling, and shift the commercial waste system for good (Recycling Today Staff, 2017) helping community members and local officials to have a tangible goal and advocacy group to be a part of to help lessen the effects of hazardous waste.

Other possible solutions that could hypothetically help Long Beach's community based on the solutions from other locations stated prior include having Rex Richardson, the Long Beach Mayor, help organize community groups or a method of communication within the community to meet up and discuss their concerns and voice their opinions (Hentges 2024). Possibly a public forum online, or a monthly community meet up where members can voice their opinions and ideas. Through the start of these meetings and discussion outlets, residents of Long Beach can protest and create alliances with city officials so that they are aware of the pollutants that enter water sources. (Alizey Villagrana 2024) On a smaller scale, developing community plans to lessen the use of cars that produce pollution, for example: walk more, use public transportation, etc. (Hentges 2024)

Similarly, more community actions must be taken, utilizing the resources and institutions in Long Beach to help reach a larger, greener goal. Working with local community colleges and Cal State University Long Beach to create student organizations and spread awareness and education would be an efficient way to target a particular demographic of students, particularly young adults from the age of 18-25, to have opportunities to learn about the climate and environmental issues occurring in their community, providing a program to help them take action in small and large ways. A possible plan to help bring this program to fruition would be reaching out to cultural anthropology and environmental science professors at Cal State Long Beach, and asking them to be a representative and mentor for student groups surrounding the environmental issues of Long Beach, titled: "Elbee's Environmental Liberation Project!" which references the university's mascot, the shark named "Elbee," who could be the face of the project for Cal State Long Beach in particular. At other community colleges such as Long Beach City College, the project could be titled: "Ole's Environmental Liberation Project!" referencing their mascot, the viking named "Ole." This project would therefore, be customizable per campus but a collective group experience, where at particular events members of both the Cal State system and Community College could come together to

discuss how to positively impact their community on a local level, therefore prompting more widespread and essential change long-term.

Finally, on a larger city level, the city of Long Beach can focus on improving public transportation options and promoting sustainable urban planning practices to reduce greenhouse gas emissions and enhance resilience to climate change impacts. (Frias-Ceballos 2024) By creating these groups to help community members have a say locally and in their government, this legislation can be prompted by these local advocates, rather than relying on one representative of the location to dictate the importance of new transportation options. Similarly to providing new transportation services for the larger community, new housing options must be created for lower-class community members who have limited options regarding affordable, livable housing. Minority groups are being disproportionately impacted. New affordable housing can be made to allow for minority groups to get the same advantage as wealthier groups. There needs to be new policies in place to help reduce the effects of carbon emission in the areas in which these people reside. (Varela Mares 2024) As stated prior, by having more collective advocacy groups and local opportunities for community members to take action, these city-wide issues can be addressed in a more timely manner and with more importance since the people affected by this legislation will be able to speak up about their personal experiences.

Local Actions Priority Ranking:

1. Work with local community colleges and Cal State University Long Beach to create student organizations and spread awareness and education regarding the effects of air pollution
2. Minority groups are being disproportionately impacted. New affordable housing can be made to allow for minority groups to get the same advantage as wealthier groups. There needs to be new policies in place to help reduce the effects of carbon emission in the areas in which these people reside.
3. Residents of Long Beach can protest and create alliances with city officials so that they are aware of the pollutants that enter water sources.
4. Have Rex Richardson(long beach mayor) help organize community groups or method of communication within the community to meet up and discuss their concerns and voice their opinions
5. Develop community plans to lessen the use of cars that produce pollution - walk more, public transportation, etc.
6. Establishing an urban green space in the country can focus on improving public transportation options and promoting sustainable urban planning

practices to reduce greenhouse gas emissions and enhance resilience to climate change impacts.

Proposed Local Education or Art Project

PROJECT TITLE: Aspiring Art Activists - Take Action!

PROJECT DESIGN

Our project relates to local high school students in the "Long Beach Unified School District" and their perspective on the impacts of air pollution in their lives. Our plan is to reach out to local high schools with a district-wide art competition, where students of any experience level can participate.

In this competition, students will be able to create an art project, of any medium and scale, to describe the prompt given by us: "Create a piece of art inspired by how you feel air pollution affects your community," and they will submit the project along with a short bio about themselves and basic information to apply.

Then, a panel of local officials, parents, teachers, and community member volunteers will review all of the submissions, deciding who will be deemed "excellent participants," "honorable mentions," "Semi-finalists," and "Finalists," revealing the results in a variety of rounds released in week long periods.

Then, once the "finalists" are selected from each school, their art and bio will be presented in a large exhibition/collage-type show at their school, honoring them and their achievement, and then all the schools "finalists/winners" will be put up in an exhibition at the largest public library in Long Beach: Long Beach Public Library.

The art from these Finalists will be displayed at this library for the community to observe, and each student will have the opportunity to speak about their art work on the exhibition reveal date. (Hentges 2024)

PROJECT DELIVERY

For this project, we plan to display a mural somewhere along the walls of each high school. Doesn't have to be a similar mural, but it gives a chance for students to be creative and artistically express themselves on how they are affected by air pollution. Those students who win the art competition will be given recognition for their memorable art and have an opportunity to place their pieces in the mural of their school. Not only will their art be presented in an art exhibition presented in their schools so they could be recognized, but we want students to place their work in the mural so every student can see their work everyday and understand the environmental injustices that they face. They could also display their work in the public libraries of Long Beach. To promote attendance, announcements, posters, flyers, and social media posts will be

used within the school community to encourage students, parents, teachers, and staff to attend the school exhibitions. For the Long Beach Public Library exhibition, promotional efforts will include outreach to local media for articles or announcements, social media campaigns with engaging visuals and relevant hashtags, distribution of flyers and posters in high-traffic areas, inclusion of information in email newsletters from school districts and community organizations, collaboration with local artists or art organizations, and participation in community events to raise awareness. Additionally, press releases will be sent to media outlets to generate coverage and interest in the project, highlighting its significance and the participation of local high school students. With this project we hope to spread awareness about environmental issues that the students are facing. They are able to express themselves in a creative way and explain how they have been directly impacted by environmental conditions in Long Beach. Through this project, more people are able to learn about the harmful environmental conditions that they might not have been aware about before. Overall, it would receive media attention and engage other residents to be more informed on these issues. (Alizey Villagrana 2024)

PROJECT EVALUATION

We decided to choose this project to give the opportunity for students to express how they view environmental conditions. This project allows for local high school students to engage in environmental issues. Raising awareness about environmental issues is an important topic to discuss and through creating this a mural can be a powerful means of advocacy. It aims to foster a sense of community involvement such as students, teachers, and local officials creating a collaborative effort to address this air pollution in Long Beach. Overall, this project will seek to inspire individuals to engage in advocacy (youth empowerment). It can help instigate discussion and collaborations that could lead to initiatives aimed at improving air quality in Long Beach.

Kayley- Our success plan for the project involves the measurement of participation rate by comparing the number of submissions to the total number of high school students in the district, aiming for a high level of engagement to signify interest in the topic. The quality of the artwork will be evaluated based on creativity, originality, and relevance to the theme of air pollution, with winning pieces effectively conveying the intended message. Community engagement will be measured through attendance at mural displays and participation in associated events, indicating interest and involvement from the broader community. The success of the project will be determined by its ability to raise awareness about air pollution among high school students and the wider community, as well as any resulting behavioral changes or advocacy efforts. Lastly, we will assess long-term impact by monitoring policy changes, community initiatives, and continued involvement in environmental advocacy efforts beyond the project's duration, ensuring sustained interest and impact. (Varela Mares 2024)

Proposed Local Action Campaign

PROJECT TITLE: Fresh Air Friends

Environmental Hazard: Toxic Air Pollution

Goal:
Our main goal is to educate high school students about their local environment through interactive and fun activities. Letting students learn about the environment through various activities allows them to explore and hopefully understand the environmental issues in their local neighborhood. (Nguyen 2024)
Ages: High School (9-12th grade)

Strategy:
Local protests, spend time designing signs to hold up and organize a day to protest (if possible, near the refineries or government buildings).
Tree planting, plant more trees on campus and possibly off campus to promote reduction of greenhouse gasses. Could also ask student families for donations towards organizations that support tree planting.
Provide students with demonstrations of how they can reduce everyday pollution at home. Conserving energy through turning their lights off when they aren't needed or carpooling to school with a friend are examples of alternatives they could approach students with. (Chan 2024)

Tactics:
We can convince students to join our program by creating advertisements to convince others to participate, as well as adding an interest form. With the interest form we can contact them to talk about what we are going to do next. Also promote our program by using social media, asking people to follow us if they are interested about the things we are doing. (Le 2024)

Workplan:
We can give students a short assessment/questionnaire before and after the program and see if scores improved from before to after. We can also use qualitative analysis and observe if general behavior and conversation surrounding the environment has shifted before and after the program was implemented.
Ritvik: We will tell them about our program through outreach via social media, and potentially reach out to other schools in other regions and talk about our program. We could also reach out to environmental agencies talking about our strategies of teaching, so that they could also more easily spread awareness about the environmental hazards to others. Also, we can show the results (the qualitative analysis and behavior improvement) of the students to prove that our teaching formula is effective. (Raman 2024)

8. RECOMMENDED EXTRA-LOCAL ACTIONS

Actions - State and Federal Level

Johnson Nguyen

The main environmental issue surrounding the Cabrillo High School and Long Beach area is the air pollution emitted by nearby oil refineries and traffic-related emissions due to its close proximity to the LA and Long Beach ports. The Cabrillo High School area is a hotspot for smog, NOX, etc. and remains one of the most air-polluted areas in California. Due to the glaring health concerns for residents in the Cabrillo High School and Long Beach communities, there have been many proposed and implemented measures by the state and federal government to counteract the toxic pollutants and emissions.

One of the first state actions to help reduce truck emissions due to transportation of goods from the ports of LA and Long Beach was to progressively ban older drayage and diesel trucks and require newer-emissions compliant engines starting from 2010 to access the port terminals. Since the program's been fully implemented in 2012, "port truck emissions were reduced by more than 90 percent" and "there are over 22,000 drayage trucks available to service the port terminals, over half of those trucks have 2010 or

newer energy-compliant engines." (Port of Long Beach) This is a huge transition to zero emission trucks in order to reduce the amount of traffic-related pollution near the Cabrillo High School and Long Beach areas, hopefully lowering levels of smog, diesel particulates, NOX, and other air pollutants. It should be effective because Cabrillo High School's located in close proximity to highways and freeways, thus the enforcement of zero emissions trucks will reduce truck-related emissions.

Another state government action includes the California Governor Gavin Newsom's executive order called the Advanced Clean Cars Act II. The Advanced Clean Cars Act II has two parts to it; the first part is to require an increasing amount of zero-emission vehicles such as electric, hybrid, and hydrogen vehicles to meet new air quality and climate change regulations. The first part works in tandem with the Governor's Executive Order N-79-20, which requires that all new vehicles sold by 2035 to be zero-emissions, in order to decrease reliance on combustion vehicles and transition over to cleaner solutions. The second part includes stringent regulations on the remaining combustion vehicles on the road to "substantially reduce air pollutants that threaten public health and cause climate change" and "provide public health benefits of at least $12 billion over the life of the regulations by reducing premature deaths, hospitalizations and lost workdays associated with exposure to air pollution." (CA Air Resources Board; Yashas, 2024). Increasing the number of zero-emission vehicles and including heavier regulations on combustion vehicles would have a tremendous impact on communities exposed to vehicle pollution, thus particularly applicable to the Cabrillo High School area because it ultimately reduces large amounts of vehicle emissions and lessens asthma risks to provide a healthier environment for residents.

A federal government action comes from the EPA (U.S. Environmental Protection Agency), who created a stronger air quality standard to protect communities like Long Beach from fine particulate pollution or soot "by strengthening the annual health-based national ambient air quality standard for fine particulate matter (PM2.5) from a level of 12 micrograms per cubic meter to 9 micrograms per cubic meter." (EPA, 2024; Suraparaju, 2024) By strengthening the air quality standard for particulate matter (PM2.5), levels of

particulate pollution will dramatically decrease and save thousands of lives as air quality increases, particularly children, older adults, and people with health complications such as asthma and cardiac issues. It would protect disadvantaged communities such as the Cabrillo High School area from deadly soot pollution and promote health equity, especially when those communities are the most vulnerable to environmental issues. Additionally, the EPA “is modifying the PM2.5 monitoring network design criteria to include a factor that accounts for proximity of populations at increased risk of PM2.5-related health effects to sources of air pollution.” (EPA, 2024; Suraparaju, 2024) By doing so, the EPA promotes environmental justice by collecting data from communities most affected by particulate pollution, which could be used for future studies that would further help reduce pollution levels.

An additional federal action includes federal officials reducing emissions from port ships and locomotives, reducing pollution in ports, and implementing stronger incentives for cleaner ships in Southern California by “using zero-emission vehicles in the goods movement industry.” (LA Times, 2022; Hentges, 2024) Incentivizing cleaner ships helps promote the reduction of port-related air pollution because an increase in cleaner port ships would help reduce levels of emissions emitted by ships, which are a huge source of air pollution from the LA and Long Beach Ports, thereby affecting communities surrounding Cabrillo High School. Furthermore, federal officials detailed a plan to "increase the $20-per-shipping-container fee to properly fund emission reduction, possibly use $60-per-container fee for cargo moving through ports, and elected officials using stronger leadership tactics and being more passionate about reducing emissions." (LA Times, 2022; Hentges, 2024) By employing the use of fees for shipping containers, the ports can reduce emissions through efficient means of transportation because it would otherwise incur further costs. The fees being used to fund emission reduction could be an additional step towards finding new alternatives that promote cleaner air, ultimately creating healthy and air-pollutant free communities near the ports such as Cabrillo High School.

Another possible federal action would be to strengthen the SB 674 Bill. Currently, the bill only requires that community air monitoring systems be installed near refineries that meet certain requirements. The existing bill "requires the owner or operator of a petroleum refinery to develop, install, operate, and maintain a fence-line monitoring system in accordance with guidance developed by the appropriate air quality management district or air pollution control district." (Legiscan, 2023; Jay Chan, 2024) Additionally, it also "requires the air districts and the owners or operators of refineries to collect real-time data from those monitoring systems, to maintain records of that data, and, to the extent feasible, provide to the public those data in a publicly accessible format." (Legiscan, 2023; Jay Chan, 2024) Strengthening the bill either by lowering the requirements in order for more refineries to qualify or ensuring the refineries follow the bill through stricter regulations would be an effective way to make sure nearly all refineries would have an air monitoring system. It's also being proposed that other types of refineries engaging in different refinery processes be included in the bill such as non crude oil feedstock and auxiliary facilities. By strengthening the bill, we make sure that those oil companies take responsibility for their emissions, which would ultimately help reduce emission levels in communities surrounding the refinery such as Cabrillo High School because owners would want to avoid fees for violating stringent regulations. More community air monitors would effectively and efficiently collect data on air pollutants emitted from those refineries, which could be used to notify the public should something occur.

In conclusion, though there are glaring environmental issues surrounding the Cabrillo High School area, there are steps being taken at the state and federal levels to help reduce levels of air pollution and provide communities with clean air.

Extra-Local Actions Priority Ranking:

1. Strengthen Long Beach's SB 674 Bill leading to increased air monitoring equipment to ensure petroleum refineries don't exceed legal limits.

2. Implement the Clean Trucks Program, which progressively ban older harbor diesel trucks from the Long Beach/LA ports , resulting in reduced diesel and NOX emissions due to newer air-compliant engines.
3. Add a new bill or law to regulate the amount of air pollution made similar to Clean Air Act.
4. Strengthen the Advanced Clean Cars II regulations enforced by the California state government by reducing the amount of pollution and emissions allowed from cars.
5. Set stronger standards to lower the harmful effects of soot pollution, and lower the allowed amount of PM 2.5 per cubic meter.

Proposed Extra-Local Action Campaign

CAMPAIGN TITLE: Terminating Traces of Traffic!

Environmental hazard:

Traffic-produced air pollution and SMOG exposure stemming from the 405 Freeway and 710 Freeway in the major Long Beach Area.

Goal:

Reduce traffic pollution and improve air quality in the Long Beach area. (Raman, 2024)

Strategy:

Expand the benefits of using non-motorized transportation, raising awareness about the impact of traffic pollution and involving the community on the issues of air quality. (Frias-Ceballos, 2024)

Tactics:

Our main tactics include weekly council meetings to reduce G.H.G emissions

("zero-emission" technology), encourage the community to petition for compensation on health risks/current health issues due to the exposure, demand the city to freely install air filtrations in homes, businesses, schools, child centers, etc. near ports and freeways (at no cost to vulnerable residents), encourage the city to plant more trees and expand nature parks, participate on Earth Day (April 22), enforce smog checks every year rather than every other year, and encourage people to turn off their engines if they're parked. (Jaussen, 2024)

Workplan:
Start by identifying existing or recently proposed bills/policies that have reduced emissions of toxic air pollutants (Clean Air Act, EPA's SmartWay Program, California Sustainable Freight Action Plan). Then, decide to build from the proposed policies.

Next, use social media to draw our attention and spread awareness about the damaging health effects of traffic pollution. Using their attention, we can visualize air pollution on the lungs, which allows them to demonstrate the impact of air pollution on their lungs by creating a set of artificial lungs that shows the damaging effects of breathing toxics (colors changes from white to gray as dust particles settle in).

Additionally, encouraging the public to reach out to organizations that can pass laws and bills can help reduce exposure to pollution like the South Coast Air Quality Management District by sending in complaints, letters, protesting, and calling meetings. (Varela, 2024)

9. RECOMMENDATIONS FOR FUTURE RESEARCH

Long Beach's Gaps - Surveys & Research

Jay Chan

Currently, we have a data gap in the knowledge of what our education system is doing, if anything, to address community responses to the environmental hazards they deal with. This is essential to the needs of Long Beach because along with the hazardous air pollution, we need to provide the necessary information to protect communities from them. An easy way to distribute the information is through school education systems, to students and their families. "If we understand the school children's curriculum, we can play a role in determining what they learn in school, particularly topics related to science and the environment. As a result, the quality of their education and knowledge of environmental hazards increase, thus benefiting the school-children and the eventual future where they grow up to be adults" (Nguyen 2024). This can also be helpful towards protecting families from emergencies such as when the air quality becomes hazardous, as children can inform their families what to do. Indirectly, our education systems can also help to protect our children's futures as educating them about the importance of

environmental issues early on can affect their perception of our environment. Research that can be done to fill this gap is surveys for teachers and schools to get a general understanding of what information they are providing and what vital information isn't being provided. The information would help "better inform-decision-making processes within our community and school regarding environmental policies, resource allocation, and conservation initiatives" (Jaussen 2024).

Similarly, we have a data gap in what information families and general residents of Long Beach receive. Not all families have access to the information school provides to them so research also needs to be done in those outlying areas. It is essential we get information from families and more general residents as we don't want to leave out any outside information, especially from sources that have limited access to information. To do this, we could conduct surveys on locals to ask for their opinions on whether they believe the government has done enough towards air pollution and if they or someone they know has been affected. As illustrated, some communities have been targeted by the toxic fumes such as the minority communities in the LA port communities (Unzueta 2022). The data would help us get a better perspective on the extent to which the detrimental effects have caused and what specific communities need the most help and supportive resources.

Another form of research that would be useful in addressing the poor air quality in Los Angeles County would be a more in depth research into government action. The "SB 674 Refinery Air Pollution Transparency & Reduction Act" was an example that demonstrated the acknowledgment of the pollution by politicians, "by establishing standard fence-line air monitoring requirements" ("Senator Lena Gonzalez"). Another example of an approach in government action was the reduction of emissions from cargo ships (Hutchings 2023). Research needs to be done not in what has been done but rather why it hasn't been enough. Underlying issues such as proper funding or indirect issues like unemployment could be revealed through proper research. A way we could conduct this research is through collection of data on whether legislation on air pollution is properly

enforced and investigation of political actions. This research is vital as change in legislation and laws would help to better enforce the everyday pollution from continuing. An additional key source of research could be the refinery workers themselves. As stated earlier, research on the refinery workers can help us gain insight on the qualitative data on whether proper regulations are put into place for their safety. The research can also provide us with quantitative data on the limitations placed on everyday refinery operations directly from the source. We could do research on their history of unionization and how successful they were (Villagrana 2024) in order to better understand what has worked. For broader information like the unionization history and limitations placed, we could directly ask the facilities about it. For more specific information we could just observe the workers or propose to the workers questions like, "Do you feel safe working at the refinery?" and "What rules are you told to follow when working here?"

Our last data gap is in how indigenous communities have responded to the air pollution. "Learning from the experiences of other indigenous communities can help develop effective strategies for defending land rights, protecting natural resources, and promoting environmental justice" (Frias-Ceballos 2024). This data would effectively provide us with more direct approaches to addressing the air pollution itself. "A comparative case study approach could be used to look at how indigenous communities in different regions have organized resistance movements, filed legal challenges, and advocated for environmental justice in the face of extractive industries like mining, logging, and oil drilling. This research could include fieldwork, interviews with community leaders and activists, analysis of legal documents and media coverage, and collaboration with indigenous organizations" (Frias-Ceballos 2024).

Qualitative Research Proposal

Efforts of Reduction: Marathon Petroleum Oil Refinery
Authors: Kayley Frias-Ceballos, Kayla Jaussen, Jayden Villagrana, Jocelyn Varela

Mares, Sarah Hentges

Research Question: How have the efforts of the Marathon Petroleum Oil Refinery to reduce toxic emissions benefited workers and local communities? (Jaussen 2024)

Social Groups:

1. Long Beach City School District local neighborhood community members
2. Marathon Petroleum Oil Refinery on-site workers
3. Officials running Marathon Petroleum Oil Refinery operations
    a. EX: Victor Ibarra - Government Affairs Manager
4. Members of Long Beach City School District
    a. Students
    b. Teachers
    c. Officials
    d. PTA - (Going to PTA meetings)
5. Students and Officials at Cal State Long Beach (Hentges 2024)

Access and Privacy: I will seek permission to enter the refinery and interview the oil refinery workers and management officials about their working conditions. I would also explain that I'm a University researcher gaining insight from possible local actions to help better their environment. I will also state that I hope my research could bring positive attention to similar workers and local communities to bring awareness to risk factors and positive solutions made by the refinery. I would be sure to make it a safe and voluntary interview for the workers and individuals of the community who prefer to stay anonymous and not state any names or addresses. I would also seek permission from the Long Beach School District to interview students and faculty and how they've been affected by certain air pollutants. Instead of doing face-to-face interviews with students who may feel uncomfortable, I would create an electronic survey that students may fill out alone or at home, voluntarily, with parents if needed, without force. My goal is to figure out if the Marathon Petroleum Refinery has benefited workers, and local communities, schools by funding certain programs and organizations to better atmospheric and health conditions. I would possibly create an informative podcast that only allows voices to be heard without showing any faces. (Jaussen 2024)

Participant Observation: I would engage with the community in their local events, and attend community meetings and volunteering events to oversee the public spaces the community lives in. I will observe the effects of the refinery emissions in the local community which involves the visibility of pollution, and talk to the residents about their experiences and perceptions of the air quality. Engage in the stakeholders that involve addressing air quality issues including community leaders, environmental activists, public health officials, and the representatives of Marathon Petroleum Oil Refinery. Build an interest with the community members, listen to their concerns, and document an observation of the changes in the air quality that are towards the refinery emissions reduction efforts. In the long run, it allows us to track the effectiveness of the

efforts and the impacts it has on the community over time. (Frias-Ceballos 2024)

Interviewing Strategies and Questions: Using in depth interviewing questions it can allow for a diverse sample of participants from different communities to give their input in the changes that are being done. It allows for a range of experience and perspectives of individuals within the local communities to provide valuable information to the Marathon Petroleum Oil Refinery.

1. How has the changes in air quality in your local communities changed over the past years?
2. Have you personally experienced any improvements in air quality?
3. Do you think the intivitiates in the refinery are anything to be concerned about?
4. Have you noticed any positive changes or negative changes in public health outcomes since the refinery has initiated the reduction?
5. Can you describe any economic or social changes in your community that you believe are connected to the refinery's efforts?
6. Do you personally feel the refinery engages with the community such as addressing concerns?
7. Are you aware of the changes in air quality? (Varela Mares 2024)

Focus Group Strategies and Questions: There are a variety of focus groups that are affected by the oil refinery including the residents, policy makers, government officials, refinery company owners, refinery workers. To begin answering the research questions we need to address the refinery company owners. It would be beneficial to have multiple representatives of the Marathon Petroleum Oil Refinery to get a range of answers. We can begin by asking “what steps they have taken to ensure the safety of their workers and residents of Long Beach”. Other questions include: What types of pollutants are being regulated, how are they managing the waste released from the refineries, and how have they improved their safety regulations over the years. Additionally, we can ask how the refiners are having a positive impact on the community, which is a question that is not seen very often. (Villagrana 2024)

Audience: The individuals who would find this research useful would be the stakeholders such as members of Refinery, local residents, community organizations, and government agencies. Residents living near the refinery would be able to gain insight into the negative or positive effects on air quality using the data to overall reflect the members of the community. Organizations can advocate for environmental justice and public health in order to improve their advocacy efforts. (Varela Mares 2024)

10. INTERSECTING INJUSTICES

Data Gaps to Systemic Disparities

Sarah Hentges, Kayley Frias-Ceballos

Data injustice refers to the unequal access to relevant data or information, which can hinder stakeholders' understanding and response to environmental hazards. In the case of Juan Rodriguez Cabrillo High School, there is a glaring lack of data regarding parent involvement within the schooling system, particularly related to attendance at parent workshops addressing environmental hazards. This data gap is attributed to an incohesive data collection system, preventing stakeholders from accurately gauging parental engagement and awareness regarding environmental issues in the community (Ritvik). Without comprehensive data on parent involvement, it becomes challenging to tailor educational initiatives effectively or allocate resources appropriately to address environmental concerns, thus perpetuating disparities in environmental justice.

Furthermore, economic injustice exacerbates environmental hazards in the area surrounding Cabrillo High School, as indicated by disparities in wealth distribution and housing quality. The housing habitability index highlights poor housing conditions, disproportionately affecting communities of color. Rent-burdened individuals, primarily from Black and Latino communities, face economic barriers that limit their access to safe and healthy living environments (Kayla, Yashas, Ritvik). Additionally, financial dependencies on fossil fuel industries further compound economic injustices, as

illustrated by the entanglement of local institutions with fossil fuel money, potentially compromising public health advocacy efforts (Ritvik).

In terms of epistemic injustice, disparities in education levels contribute to a lack of awareness about environmental hazards among residents. Low rates of high school graduation and college attainment hinder residents' ability to comprehend and address pollution in the Long Beach area. This lack of knowledge perpetuates environmental injustices, as communities may not be equipped to make informed decisions or advocate for their rights (Justin Le, Ritvik). Efforts to address epistemic injustice include adapting the education system to emphasize environmental hazard curriculum and making schooling more accessible to increase graduation rates (Ritvik).

Furthermore, environmental hazards disproportionately impact specific social groups, particularly communities of color, highlighting racial injustice. West Long Beach, a predominantly Latino community, faces higher risks of asthma and lower life expectancy due to pollution-related illnesses (Sarah, Kayla). Policies aimed at mitigating racial injustices include providing more medical care and support to minority communities and advocating for affordable housing in less polluted areas (Kayla, Sarah). Overall, addressing these various forms of injustice is crucial for achieving environmental justice and safeguarding the well-being of communities affected by environmental hazards.

CONCLUSION

In conclusion, there are several factors that may be blocking environmental protection and justice in Long Beach. Some factors are the economic dependence Long Beach has on the oil refineries and port related activities. They might be resistant to transitioning away from these industries because of financial losses that could come along. Also local communities that are directly affected by the pollution lack the political power and financial resources they need to implement their protective measures. Decision-makers may prioritize short-term economic gains over long-term environmental sustainability which may lead to neglect of the long-term health and environmental consequences.

There are many actions that have been taken over the last decade to support a just transition in Long Beach, such as state and government actions. State actions include banning older drayage and diesel trucks and requiring new emissions, compliant engines, and Governor Gavin Newsom's executive order called *The Advanced Clean Cars Act II*, which involves zero-emissions vehicles such as electric, hybrid, and hydrogen cars and regulations on the remaining combustion vehicles. Government actions include the Environmental Protection Agency, who created a stronger air quality standard to protect communities of Long Beach, and federal officials reducing emissions from port ships and locomotives, reducing pollution in ports, and implementing stronger incentives for cleaner ships in southern California. There have also been actions from stakeholders such as Marathon Petroleum L.A. Refinery, who are working towards meeting regulatory standards and implementing emissions-reducing initiatives to follow the regulatory agencies of the California Air Resources Board, and port authorities, who have funded air filtration systems in nearby schools.

In the future, constructing new technologies and systems so that there are less harmful emissions from oil refineries, ports, etc. will also lower the environmental hazards within Long Beach. These technologies must also be enforced through policies and regulations, as it is essential that the people in power do their best to mitigate the issue of pollution. In Long Beach, the most prominent priority regarding near-term environmental justice goals is to develop a stronger community system led by an official to help spark more community involvement and education, to therefore help reduce the effects of pollution in their daily lives by taking action in the Long Beach Unified School District area, creating local programs in schools and universities to create both an outlet and resource to help students and officials advocate for their health and wellbeing.

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FIGURES