

Authors

Robinson Ryan, Te Likang, Portillo Cristabel, Lee Gerald, Hernandez Ciara, Zublin Emil, Hamdan Jiji, Dadi Supriya, Karim Fariha, Sridhar Rishab, and Whipps Zachary

Teaching Team

This case study report was developed by students at the University of California Irvine for the undergraduate class, "Environmental Injustice," taught by Kim Fortun (kfortun@uci.edu), Tim Schütz (tschuetz@uci.edu) and Kaitlyn Rabach (krabach@uci.edu) for the Department of Anthropology, Summer 2020.

Biographical Statements

Emil Zublin is a first year student at UC Irvine pursuing a degree in Computer Science and Engineering. Born and raised in Clovis, CA, he has been very interested in global and local societal issues, including climate change. He hopes to take his experience living in the San Joaquin Valley to tackle climate change problems regarding agriculture with software and hardware applications.



Gerald Lee is a second year student at the University of California, Irvine under the Henry Samueli School of Engineering. He is studying Biomedical Engineering, with interests in developing imaging technology and discussing ethics both inside and outside the laboratory.



Supriya Dadi is a second-year Biomedical Engineering: Pre-Medical student at the University of California, Irvine. She plans to go to medical school after graduating, as she is interested in how to combat the health impact of pollution. She is currently a publicity officer in both Human Biology Club and Student Health Outreach.



Ciara Hernandez is a senior at the University of California, Irvine and is a psychology major with an emphasis in cognitive neuroscience. She is particularly interested in artificial intelligence, computational brain modeling and neuroimaging research regarding white matter fiber tracts. She is interested in advocating against the disproportionate allocation of environmental hazards in vulnerable communities domestically and internationally.



Cristabel Portillo will be going into her second year as a Undeclared major at the University of California, Irvine. She is currently pursuing Biochemistry with a minor in Medical Anthropology. Cristabel has been able to take various classes that peaked her interest in taking Anthropology 25A in order to broaden her knowledge about environmental issues going around her and globally. She would like to learn more about environmental injustices occurring and how to help combat these issues.



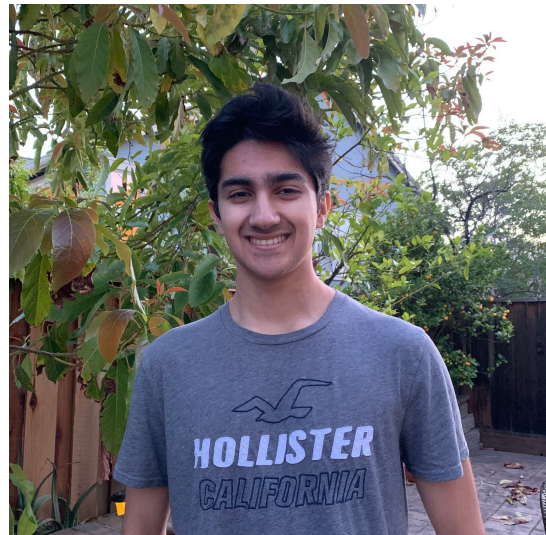
Fariha Karim is a first-year at UC Irvine majoring in biological sciences. She is invested in learning about the environment and the impact humans have on it, hoping to apply what she learns to the world around her through research and informing others.



Jiji Hamdan will be a sophomore this fall at the University of California Irvine majoring in Environmental Science & Policy. Living in Dubai most of her life, Jiji has been a passionate marine conservationist and environmental activist since a very young age and is eager to share her knowledge and experiences on environmental issues to make change and persuade others to do so as well.



Rishab Sridhar is a second-year student at the University of California, Irvine majoring in Computer Science & Engineering. His interests include environmental policy and sustainability. He wants to contribute to solving and tracking climate change issues using software.



Likang Te is a fourth-year Public Health student at the University of California, Irvine. During the years majoring in Public Health Policy, She has learned how to collect, organize, and activate health data and create interventions to prevent and manage the disease. She had her practicum at UCI sustainability center, a school organization that spent lots of resources and approaches to decrease plastic wastes and student's sugary beverage consumption. After this summer, she will finish her public health degree with a medical anthropology minor, and she will apply for graduate school in the Spring quarter of 2021. After finishing graduate school, she is planning to apply for a job position from a life science company that develops the next generation of health solutions.



Zachary Techall Whipps, will be a second year Civil Engineering student at UC Irvine this fall. His upbringing in the Pacific islands of Palau have given him deep respect and appreciation for the sea. Marine conservation and environment sustainability are issues that he is very passionate about and they affect him on a personal level. He is in the process of changing his major into Environmental Engineering to help promote sustainable development.



Ryan Robinson will be a second year Biological Science major at the University of California, Irvine. Being able to witness the BP oil spill in the Gulf of Mexico first hand, an interest in environmental sciences sparked. Ryan is excited to work in groups to learn about everyone's experiences and to take advantage of an individual's expertise as an outlet to learn and grow as a person.



TABLE OF CONTENTS

INTRODUCTION	9
SECTION 1: County Setting & Assets [Rishab Sridhar]	11
SECTION 2A: Climate Change as Combo Disaster [Ciara Hernandez]	16
SECTION 2B: Climate Change as Combo Disaster [Supriya Dadi]	20
SECTION 3: Compound Vulnerabilities [Cristabel Portillo]	24
SECTION 4: Stakeholder Analysis [Jiji Hamdan]	29
SECTION 5: Stakeholder Actions [Gerald Lee]	33
SECTION 6: Role of Media and Big Environmental Organizations [Ryan Robinson]	37
SECTION 7: Recommended Local Actions [Emil Zublin]	40
SECTION 8: Recommended Extra-Local Actions [Fariha Karim]	43
SECTION 9: Recommendations for Future Research [Zachary Whipps]	46
SECTION 10: Injustice Analysis [Likang Te]	49
FIGURES	59
APPENDIX	61
Appendix 1: SKETCH: County Assets	61
Appendix 2: SKETCH: Environmental Hazards	62
Appendix 3: SKETCH: Compound Vulnerabilities	63
Appendix 4: SKETCH: Stakeholder Analysis	65
Appendix 5: SKETCH: Stakeholder Actions	67
Appendix 6: SKETCH: Media & Enviro Org Coverage	69
Appendix 7: SKETCH: Possible Local Actions	70
Appendix 8: SKETCH Possible Extra-Local Actions	72
Appendix 9: SKETCH: Data & Qualitative Research Design Proposal	73
Appendix 10: SKETCH: Multiple Forms of Injustice	74

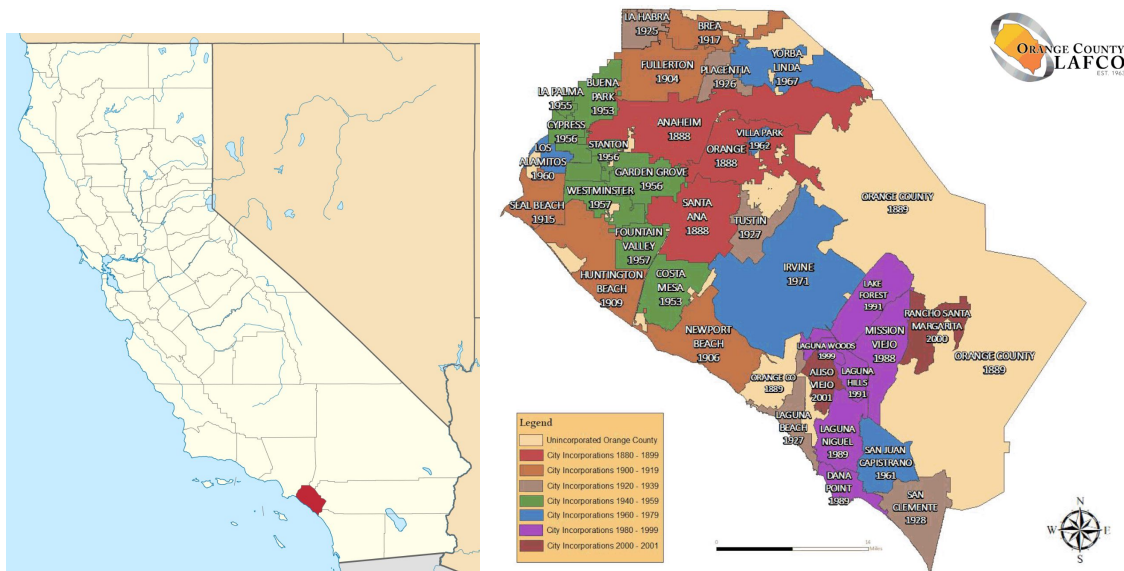


Figure 1. Location Map of Orange County, CA. The map on the left shows Orange County shaded in red, and the map on the right shows all 34 incorporated cities within the county (Screenshot by Cristabel Portillo. Wikipedia, retrieved July 15, 2020).

INTRODUCTION

This case study report focuses on climate change in Orange County.

Climate change causes both **fast** and **slow** disaster: Climate change has led to increasing incidence of extreme weather (hurricanes, catastrophic flooding, and dams breaking, for example) and also to slow, less dramatic but still very threatening changes -- in water availability, agricultural productivity, disease incidence, and so on. This is why we refer to climate change as a **“combo disaster.”**

The report addresses a series of **ten questions** that draw out local details in a manner that encourages comparison with other places. The research has been done quickly (within the constraints of a quarter-long undergraduate class) so is limited to and points to the need for further research and community engagement.

The goal is to help build both a body of research on environmental injustice and a network of researchers ready to help conceptualize and implement next-generation environmental protections.

INTERDISCIPLINARY ENVIRONMENTAL INJUSTICE CASE STUDY
<ol style="list-style-type: none">1. What is the setting of this case?2. What environmental health threats (from worst case scenarios, pollution climate change, etc) 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 the problems in this case?6. How have news agencies and advocacy organizations brought attention to environmental problems in this setting?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, in your view, is ethically wrong or unjust in this case?

Figure 2. This is the analytic framework that guided research for this case study.

SECTION 1: County Setting & Assets [Rishab Sridhar]

Orange County is a diverse county that has both environmental assets and risks. The county is located in Southern California in a coastal area bordered by the Pacific Ocean. Orange County is home to about 34 cities and the setting is primarily urban. Cities like Laguna Beach and Dana Point are situated on the coast, while there are inland cities such as Santa Ana and Anaheim. The Native Territories in Orange County primarily belonged to the Tongva and the Acjachemen (Native Lands 2020). The political system of Orange County has a board of supervisors with five members, and it has six countywide officials who are primarily Republican (OCGov n.d.).

According to the U.S. Census Bureau, the population of Orange County is about 3,175,000, 34% identify as Latinx and 21.7% as Asian. An estimated 10.5% of the population live in poverty; 39.9% of residents have a Bachelor's degree (U.S. Census Bureau QuickFacts 2019). The median income in Orange County is \$85,398 and the population density is 3,807 people per square mile (U.S. Census Bureau QuickFacts 2019). According to the EPA EJScreen Report in Figure 3, Orange County has a relatively lower demographic index compared to the USA but similar compared to California; however, Orange County has almost 50% low-income population, which is close to both the USA and California average (EPA EJScreen 2019).

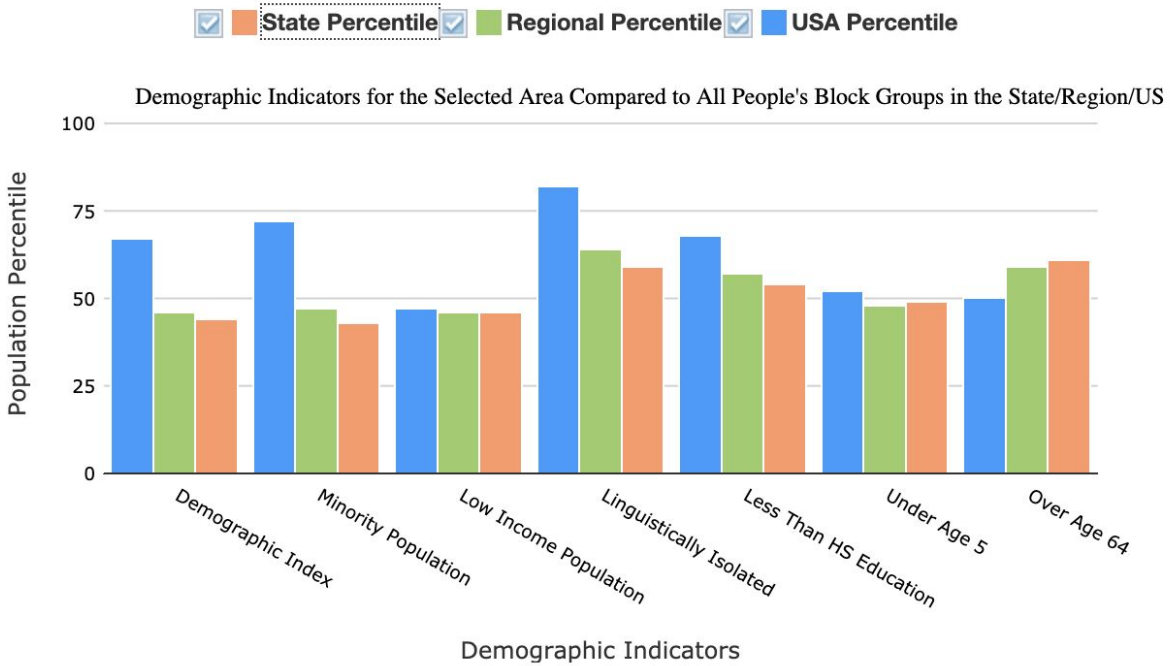


Figure 3. The Demographic Index Map of Orange County is shown above and displays the percentages of indicators in that region. The graph on the bottom shows the demographic indicators of Orange County compared to California and the United States. (Screenshot by Rishab Sridhar, July 2020. From *EPA EJScreen Report*, retrieved July 15, 2020. <https://ejscreen.epa.gov/mapper/>)

There are several community assets in Orange County. For instance, one community asset is the decentralized climate action plan that cities in Orange County have. Orange County does not have a county-wide climate action plan, but each of its cities has its own general plan to combat climate change. According to Figure 4, the city of Irvine has proposed its own Climate Action Plan, where they plan to convert to 100% clean energy and enforceable regulation standards (Capretz 2016). Even though this area already is experiencing health hazards, it is actually one of the most vulnerable cities in the United States in case of an emergency (Tekin 2019).



September 30, 2016

Bill Jacobs, AICP CEP, Principal Planner
City of Irvine, Community Development Department
1 Civic Center Plaza
Irvine, CA 92606
Via Email: bjacobs@ci.irvine.ca.us

Cc: Mayor Steven S. Choi, Ph.D. and Irvine City Council

Subject: Recommendations for Irvine Climate Action Plan (CAP)

Dear Mr. Jacobs,

Thank you for taking the time to discuss climate planning with representatives from Orange County for Climate Action (OCCA) and Climate Action Campaign (CAC) in recent months. CAC is committed to helping cities in Southern California pass and implement successful climate plans that protect the people and places we love for generations to come. OCCA is an alliance of organizations to address climate change throughout Orange County.

Our organizations commend the City of Irvine for its efforts to think proactively about climate, mobility and quality of life as it creates the Irvine 2035 Plan. The following letter outlines our recommendations for the City of Irvine to create a legally binding Climate Action Plan (CAP) in conjunction with its General Plan Update process.

Much has changed in the political landscape of climate change in the past seven years since Irvine created its 2009 Draft CAP. Cities like San Diego have shown that ambitious, 100% Clean Energy climate plans can pass with unanimous, bipartisan support and a hearty endorsement from business and labor communities. SB 32, signed just last month, commits the state to achieving statewide greenhouse gas (GHG) reductions of 40% below 1990 levels by 2030 (codifying Governor Brown's Executive Order B-30-15 last year and consistent with Executive Order S-3-05 goal of 80% GHG reduction by 2050).

Further, Irvine's General Plan Update process presents an exciting opportunity for the City of Irvine to show environmental leadership by creating a CAP that fulfills the City's legal requirements under the California Environmental Quality Act (CEQA) to mitigate the expected GHG impacts of its General Plan.

Climate Action Campaign
4452 Park Blvd., Suite 209 San Diego, CA 92116
www.climateactioncampaign.org

Figure 4. Climate Action Plan in Orange County. This letter is written by Nicole Capretz to Bill Jacobs, the Community Development Planner of Irvine. The report calls for Irvine to switch to clean energy and enforce stricter regulations on corporations. (Screenshot by Rishab Sridhar, July 2020. *Nicole Capretz*, retrieved July 15, 2020. http://occlimateaction.org/wp-content/uploads/CACLtr_IrvineCAP.pdf)

Another asset the county has is a governmental organization to educate

residents about environmental hazards in their area. According to Figure 5, only 57% of Orange County residents believe that global warming is mainly caused by human activities (Yale Climate Change Communication 2019). This is relevant because while there is a large amount of pollution in the area, there is still a substantial amount of adults who are uneducated or unaware of environmental hazards in their area. The California Regional Environmental Education Community creates partnerships across California to educate students and the public about environmental hazards in their area, with regions covering Orange County (California Department of Education n.d.). The risk of hazardous materials in Orange County causing negative health consequences have also prompted activists to take action.

Estimated % of adults who think global warming is mostly caused by human activities (53%), 2019

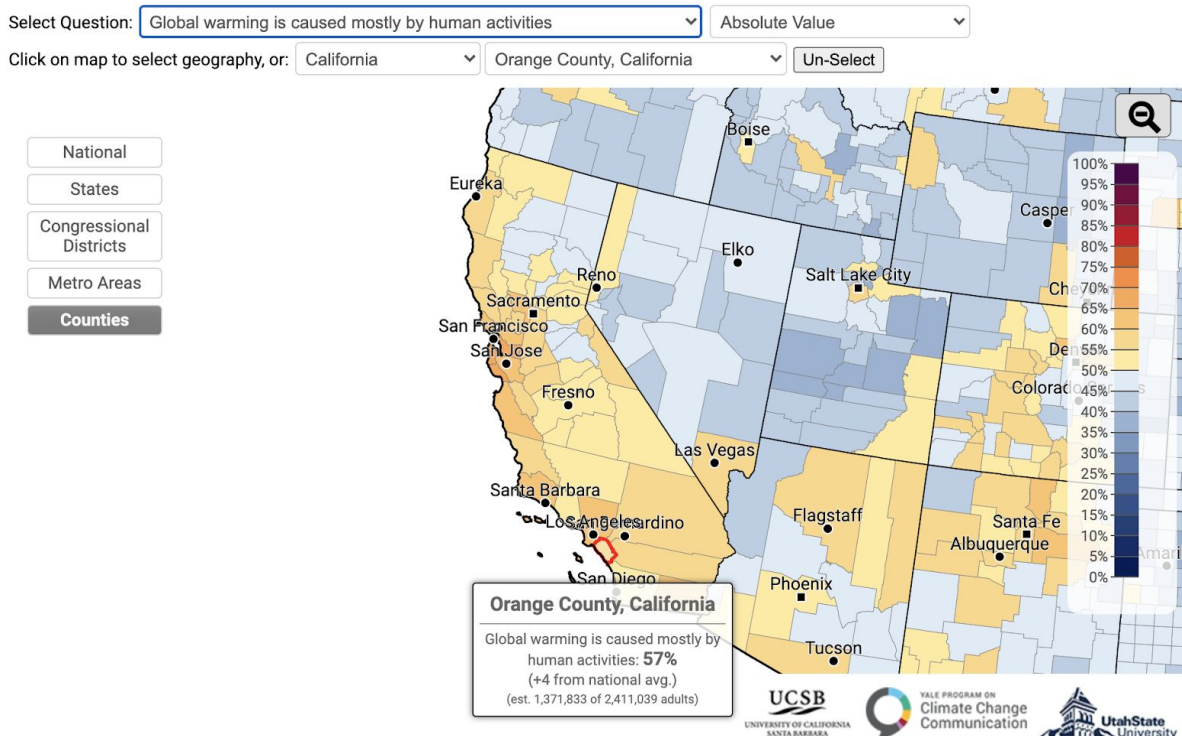


Figure 5. The figure shows the estimated % of adults who think global warming is mostly caused by human activities; only 57% of people in Orange County believe that humans caused global warming. (Screenshot by Rishab Sridhar, July 2020. Yale Climate Opinion Map, *Yale Program on Climate Change Communication* retrieved July 15, 2020. [https://climatecommunication.yale.edu/visualizations-data/ycom-us/.](https://climatecommunication.yale.edu/visualizations-data/ycom-us/))

Finally, another community asset is the environmental organizations that are formed by activists who strive to draw awareness to pollution and OC's contribution to climate change. The Orange County Environmental Justice is an organization that focuses on grassroots leadership and fights for environmental justice in Orange County; currently, this organization is working to stop lead contamination of the soil in OC census tracts (Cabrera 2017).

SECTION 2A: Climate Change as Combo Disaster [Ciara Hernandez]

There are several enclaves of Orange County that are subject to varying degrees of slow and fast acting environmental threats, some more than others. Environmental threats such as these create a toxic mix that acts as a catalyst for climate change. According to Orange County Coast Keeper due to climate change sea levels on the Orange County coast are expected to rise one foot over the next forty years and four to five feet by the turn of the century (Orange County Coast Keeper 2019). Similarly, this creates an inverse effect for the neighboring pacific ocean in a process called ocean acidification, which occurs concurrently with climate change (Orange County Coast Keeper 2019). This is referring to the absorption of about a quarter of heightened atmospheric CO₂ by the ocean which lowers the pH value and the ocean becomes more acidic as a result, wreaking unforeseen havoc on the ecosystem below (Orange County Coast Keeper 2019). A timely example of what this could mean for California coastlines was perhaps previewed over the Fourth of July weekend this year in Newport Beach when an aggressive high tide washed into the posh beachfront neighborhood (Chang 2020). This particular instance shows us what detrimental effects a rising sea level can have, neighborhoods that scatter the coast could be washed away by new increasing parameters set by our ocean as a result of climate change. In addition to rising tides of the future Orange County has a few sites such as the Ralph Gray Trucking Co. which has the highest flood hazard in the county identified by the U.S. Government Accountability Office, shown below in Figure 6.

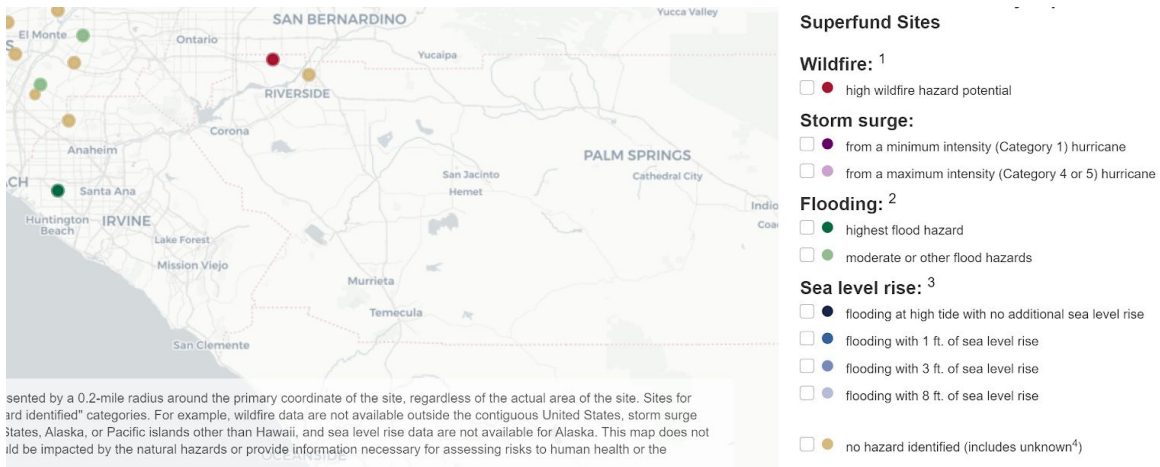


Figure 6. The two superfund sites in Orange County are the Ralph Gray Trucking Co. in Westminster, which had the highest flood hazard, and the McColl in Fullerton, which had no hazard identified.

(Screenshot by Supriya Dadi, June 2020. Superfund Sites and Climate Change, *U.S. Government Accountability Office*, October 18, 2019, retrieved June 29, 2020).

There is plenty of potential for worst case scenarios as there are multiple oil refineries, chemical plants emitting invisible toxic clouds as well as multiple chemical waste storage and disposal facilities which all contribute to worst case scenarios. This risk became very real for Orange County residents in 1990 when a town with a rich oil history, Huntington Beach, saw a massive oil spill that dispersed nearly 300,000 gallons of crude Alaskan oil onto the blue California coastline (Matthews 1990). To much surprise, this 800-ft. tanker that was poised to pump crude oil into an offshore pipeline only spilled 1% of its cargo yet the results were devastating for the surrounding ecosystem (Matthews, 1990). More recently earlier this year in January of 2020 a toxic leak of hydrogen sulfide exposed five employees at a water treatment plant in Yorba Linda to imminent and undetermined danger (NBC Los Angeles 2020).

Similar to these fast acting disasters, Orange County is the host to slow

insidious ones as well, with one of the most flagrant perpetrators of negating environmental courtesy being Anaheim (Coker 2013). Some of these examples can be seen in figure 7 just below, which highlights the cost of having both a petroleum waste facility like McColl and facilities like the El Toro Marine Corps Air Station, which is a perpetrator of volatile airborne pollution, in the backyards of Orange County residents. Anaheim is world-renowned as the home to a very famous mouse, however, Disneyland pumps more than just pixie dust into the neighborhoods of Anaheim. Disneyland is the host to ever increasing full-scale commercial firework shows that regularly infuse lead, strontium, copper, and titanium at massive volumes into the air (Polan 2020). Since the park's inception in 1955, it's impossible to truly estimate how much Disneyland has polluted not just Anaheim, but all of Orange County. Not only does the park host elaborate nearly nightly fireworks, but the immense human traffic adds an added onslaught of vehicular air contamination (Coker 2013).

In fact, a 2014 LA Times article found significantly higher air pollution near I-5 in Anaheim that directly neighbors Disneyland (Barboza 2014). In response, the proper California entities promised to impose stricter freeway air pollution restrictions regarding vehicular emissions, however, the annual attendance of Disneyland, just off the freeway, reported since 2014 has risen from 16.77 million visitors to 18.66 million visitors in 2018 (Lock 2020). One must beg the question if this steadily increasing visitor count is a scaling variable for these supposed restrictions. These fireworks that pop off in the name of magic and entertainment remain largely unchecked as these toxic emissions are not only normalized but are vehemently encouraged by Orange County officials whose eyes remain predominantly fixed to the economic bottom line of having one of the most world-renowned tourist attractions.

El Toro Marine Corps Air Station

EL TORO MARINE CORPS AIR STA

The El Toro Marine Corps Air Station covers approximately 4,700 acres. Commissioned in 1943, it supported the Fleet Marine Forces in the Pacific Ocean, serving as the major west coast jet fighter facility. The Station was decommissioned as an active base in 1999 under the Base Realignment and Closure Act. To date the golf course parcel has been transferred under the Department of the Interior's Land for Parks program and approximately 2800 acres have been sold through an auction and transferred in part to Heritage Fields LLC. Redevelopment efforts are on-going. A total of 25 potentially contaminated areas were identified on the Air Station, including four landfills suspected of containing both hazardous and solid waste, and other areas where polychlorinated biphenyls (PCBs), battery acids, leaded fuels, and other hazardous substances were suspected of being dumped or spilled. A Remedial Investigation conducted by El Toro identified volatile organic compounds (VOCs), primarily trichloroethene

[Read More](#)

HAZARDOUS RANKING SCORE

37 / 100



A score of 28.5 or higher qualifies a site for the Superfund National Priority List.

REGIONAL CONTACT

Region 9

Phone: (415) 947-4251

[Contact Region](#)

[Share 0](#) [Tweet](#) [Subscribe](#)

Mccoll

ROSECRANS & SUNNY RIDGE

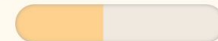
From 1942-1946 the 22 acres composing what was to become the McColl Superfund Site was a disposal area for petroleum refinery waste. During that period, twelve unlined pits or sumps were dug and filled with an estimated total of 72,600 cubic yards of waste. At the time the waste pits were created, the local area was sparsely populated. Refinery operations took place on land located to the north and northwest of the site. During the 1950s and early 1960s, in an attempt to control site odors, three sumps in the Ramparts area were covered with drilling mud. In the late 1950s, six sumps at the lower end of the property were covered with natural fill materials during the construction of the adjacent Los Coyotes Country Club golf course. Additional soil cover was placed over the upper Ramparts sumps in September 1983.

Subsequently residences were built on adjacent land and eventually the golf course expanded to include the closed site. The site initially was brought to the attention of regulatory agencies

[Read More](#)

HAZARDOUS RANKING SCORE

42 / 100



A score of 28.5 or higher qualifies a site for the Superfund National Priority List.

REGIONAL CONTACT

Region 9

Phone: (415) 947-4251

[Contact Region](#)

[Share 0](#) [Tweet](#) [Subscribe](#)

Figure 7. The El Toro Marine Corps Air Station is next to both Portola High School and Orange County Great Park. Given that the site qualifies as a national priority and used to store the carcinogenic chemicals of PCBs, VOCs, lead, TCE and other hazardous chemicals, it is shocking to see schools and parks built near that area since the area has not been cleaned up and long term impacts are still unknown. The McColl petroleum waste facility, which was contaminated by the companies Phillips Petroleum Company and Shell Oil Company, is also a national priority. The site contains benzene, THTs, sulfur dioxides, ethylene, butane, and other metals. Unfortunately, they now suspect that the chemicals are contaminating the groundwater. (Screenshot by Supriya Dadi, June 2020. *ToxicSites*, retrieved June 29, 2020).

SECTION 2B: Climate Change as Combo Disaster

[Supriya Dadi]

The principal environmental threats explored in this report include climate change and its resulting impact on environmental injustices and vulnerabilities. Climate change causes a myriad of issues and exacerbates current health issues; as a result, endangering communities already vulnerable to coronavirus. The climate change-related environmental hazards discussed in this section include air pollution, extreme heat, wildfires, droughts, and sea-level rise.

One of the main factors aggravating climate change is air pollution and the emission of greenhouse gasses like carbon dioxide. Air pollution is measured through the ground-ozone level and particulate matter (PM 2.5) levels which are 48.9 ppb (placing it in the 88% percentile) and 11.7 ug/m³ (placing it in the 97% percentile) respectively. Furthermore, the traffic proximity in the county is 7300 daily vehicles/meters distance, placing it in the 98% percentile (EPA 2020). Given the high percentiles, it's not surprising that the poor air quality levels lead to 9330 deaths per year (Perkes 2016).

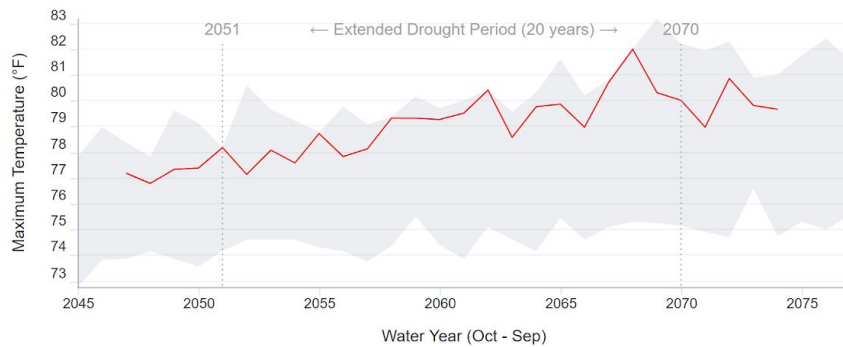
Climate change also brings about extreme heat. A study shows that the area will have 3 to 5 more heatwaves by 2050 and this number will increase 12 to 14 by 2100. Heatwaves bring about heat stress and heat strokes. It can exacerbate pre-existing conditions which are already prevalent due to an increased number of factories, respiratory diseases as the increased sunlight increase the amount of smog and PM_{2.5} produced, and allergies as increased heat and carbon dioxide mean more pollen is produced (CDPH 2017).

Similar to heat, studies have shown an overall decline in precipitation over the next few decades, which means an increased number of droughts. Droughts increase the risk for wildfires, dust storms, extreme heat events, flash flooding, dust

storms, degraded water quality, and reduced water quantity. Likewise, sea levels are increasing rapidly. The impact can be seen more clearly in Figure 9, which illustrates extended drought scenarios by showcasing how the precipitation will decrease from 12.5 to 9.7in and how the temperature will have steadily increased from 72 to 79.2 F.

Maximum Temperature

Maximum daily temperature which typically occurs in the early afternoon.



OBSERVED HISTORICAL
1961–1990 Average

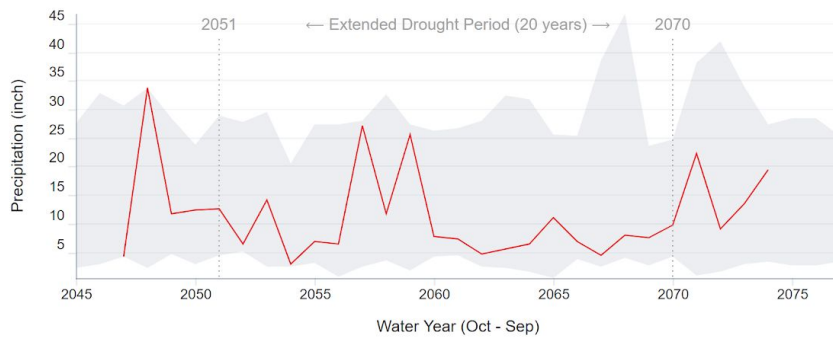
72.0 °F

DROUGHT SCENARIO
2051–2070 Average

79.2 °F

Precipitation

Accumulated rainfall and snowfall.



OBSERVED HISTORICAL
1961–1990 Average

12.5 inch

DROUGHT SCENARIO
2051–2070 Average

9.7 inch

Figure 9. The first figure illustrates how the maximum temperature is going to continue to increase. The second figure illustrates how precipitation is going to continue to decrease. These two graphs illustrate how droughts are going to continue to get worse in Orange County in the future as less rain is being coupled with higher temperatures. (Screenshot by Supriya Dadi, June 2020. Future

Extended Drought, *cal-adapt*, retrieved June 29, 2020.)

Furthermore, Climate change has caused wildfires in Orange County to be disastrously worse and potentially cost the lives of many. For example, the Camp Fire of 2018 killed 88 people and obliterated the town Paradise in a single day. A shorter rainy season has led to dryer shrubs and trees; in turn, this has led to longer, drier, and hotter fire seasons (Samenow and Freeman 2019). In the event of a wildfire, there are injuries and death from burns and smoke inhalation, eye and respiratory illnesses due to air pollution, the exacerbation of asthma, allergies, chronic obstructive pulmonary disease (COPD), and other cardiovascular and respiratory diseases, increased risk from erosion and land slippage after wildfires, and displacement and loss of homes. (CDPH 2017). The impact can be seen more clearly in Figure 8, which shows the CPUC Fire Map.

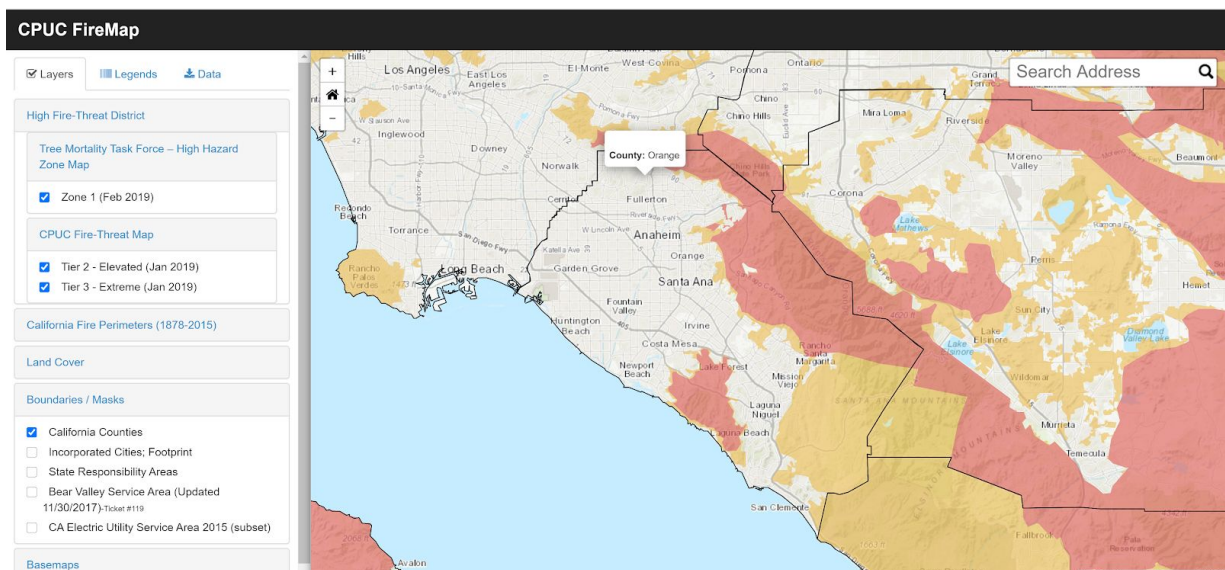


Figure 8. The figure shows areas in Orange County that are at high risk for wildfires. Areas highlighted in red are a Tier 3 risk (these areas Laguna Coast Wilderness park and the Trabuca Silverado Canyons), and areas in yellow are a Tier 2 risk (this area includes Capress Wilderness Park). (Screenshot by Supriya

Dadi, July 15, 2020. Fire Map, *California Public Utilities Commission*, retrieved June 29, 2020. <https://ia.cpuc.ca.gov/firemap/>)

Likewise, sea levels are increasing rapidly. By 2100, sea levels may rise up to 66 inches, threatening Venice Beach, the Port of Long Beach, the South Coast naval stations, and San Diego Harbor. As a result, making Orange county is 28% more vulnerable to floods (CDPH 2017). In addition, sea-level rise would lead to land erosion that could sink infrastructures within the next fifty years (Orange County Coastkeeper). Additionally, sea-level rise can increase the frequency of severe floods and storms.

To make matters worse, Figures 10 and 11 showcase how unprepared the county is in the event of any of these disasters.

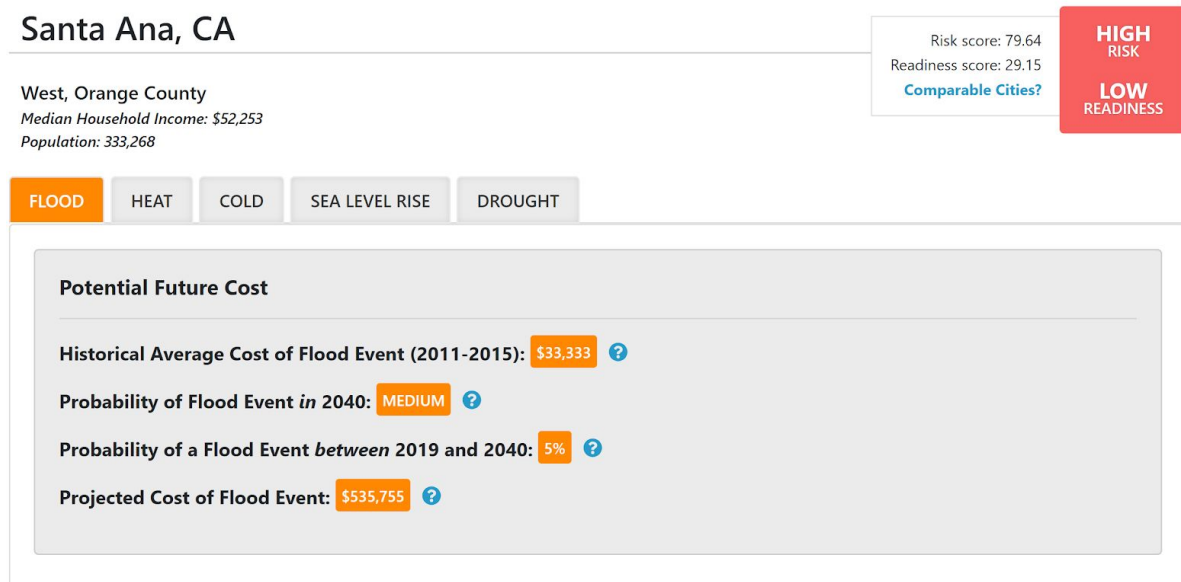


Figure 10. Santa Ana has a high risk score (79.64) and low readiness score (29.15). It has 54.9 score in risk, 70.5 score in sensitivity, 35.5 score in exposure, and 21.9 score in adaptive capacity. Additionally, a 29.1 score in readiness, 27.2 score in economy, 27.5 score in social, and 32.6 score in governmental. (Screenshot by Supriya Dadi, June 2020. Urban Adaptation Assessment, *Notre Dame Global*

Adaptation Initiative, retrieved July 15, 2020. <https://gain-uaa.nd.edu>)

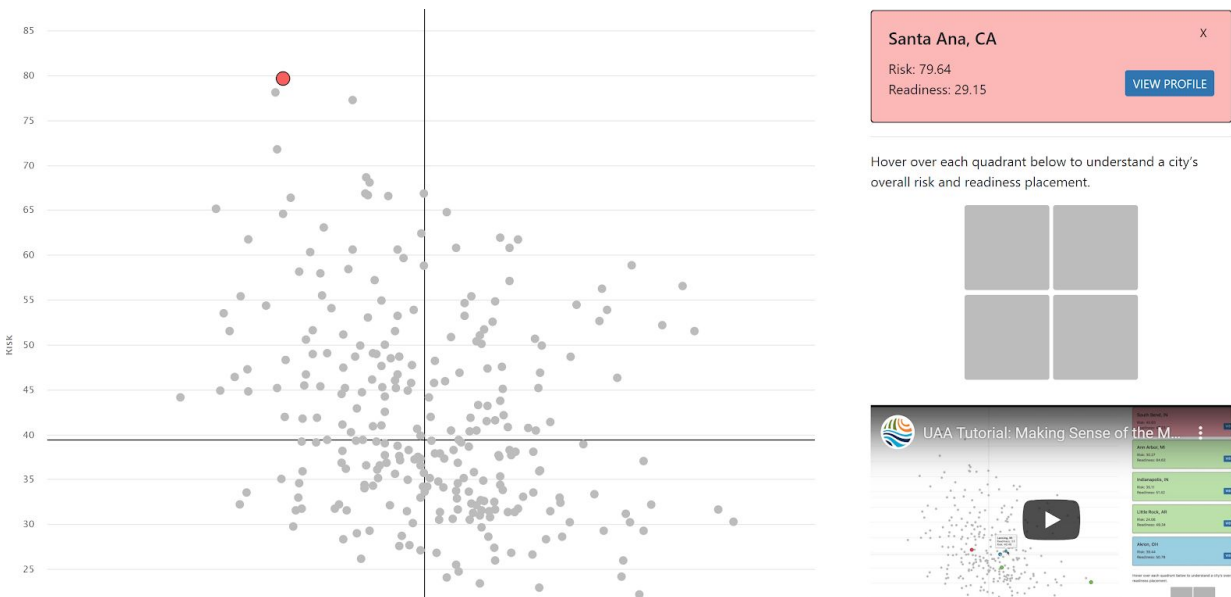


Figure 11. Given that Santa Ana has both an alarming risk score (79.64) and readiness score (29.15), its position in the second quadrant makes sense. It has 54.9 score in risk, 70.5 score in sensitivity, 35.5 score in exposure, and 21.9 score in adaptive capacity. Additionally, a 29.1 score in readiness, 27.2 score in economy, 27.5 score in social, and 32.6 score in governmental. (Screenshot by Supriya Dadi, June 2020. Urban Adaptation Assessment, *Notre Dame Global Adaptation Initiative*, retrieved July 15, 2020. <https://gain-uaa.nd.edu>)

SECTION 3: Compound Vulnerabilities [Cristabel Portillo]

Environmental health vulnerabilities and injustices do not stem from environmental issues alone, they are usually strongly rooted in certain communities due to

intersecting factors. Factors such as socioeconomic ones that fail to bring equity towards all and prioritizes a group over the other. Orange County is no exception, it has cities that are well-planned out and have one of the lowest crime rates in the state such as Irvine, however, it also has cities such as Santa Ana that are suffering from drastic COVID-19 cases and possible toxic soil.

In the opportunity index, Orange County is rated as a B for their opportunity score (see Figure 12). The opportunity index takes into account four indicators: economy, education, health, and community and provides a score that indicates opportunities in a community (Opportunity Index 2018). Orange County is above the state and national average for most indicators except for health in terms of state average. This opportunity index takes into account a county as a whole, so it can't be informative of the opportunities available for individual cities, such as Santa Ana that one can estimate are below average. For example, Santa Ana's income is lower than Laguna's Beach, and its poverty rate is significantly higher.

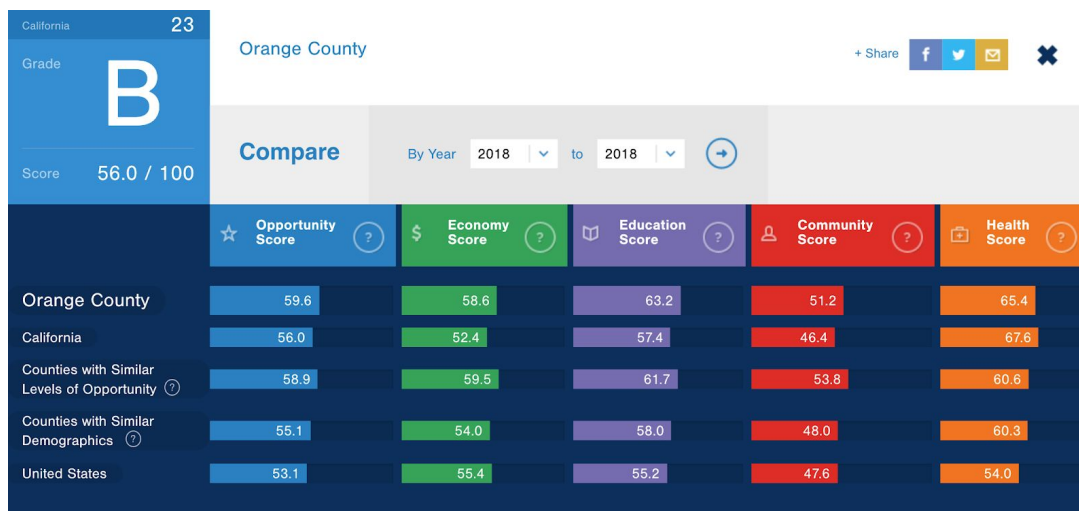


Figure 12. The opportunity index gives a score to counties based on their opportunities for the economy, education, community, and health. The average for Orange County is a B, this is from a ranking of A (best) to F (worst). This index takes into account Orange County as a whole and may not be representative of

the opportunities for individual cities within this county. (Screenshot by Cristabel, June 2020. *Opportunity Index*, retrieved July 15, 2020).

The percent of people living below twice the poverty level is higher than 93% of census tracts in California for Santa Ana – a stark contrast to the 11% of people living below twice the poverty level in Laguna Beach (California Office of Environmental Health Hazard Assessment 2018). Upon further research, the city of Laguna Beach has a budget of \$108.4 million for its roughly 23,000 residents (LA Times 2019). For the city of Santa Ana, its budget is \$646 million for its 332,725 residents (Nixle 2019). This means that for every resident in Laguna Beach they receive about \$4,713, and for every resident in Santa Ana they receive \$1,942. The budget for the city of Santa Ana is not enough to meet the satisfactory needs for residents in terms of safety, health, and especially for environmental health hazards. This situation is exacerbated because the Santa Ana Council recently voted 6 to 1 to increase police spending to nearly \$3 million despite many residents opposing the idea (Pho 2020). With \$3 million dollars, it could have been allocated to increase fundings for environmental issues and organizations such as OCEJ.

Another intersecting factor is that Orange County is in the top 20 confirmed COVID-19 cases in the nation (Johns Hopkins University 2020). However, low-income and mostly Hispanic or Latino cities such as Santa Ana and Anaheim are being hit far more by the contagious disease than other affluent and white cities such as Laguna Beach and Irvine (OC Health 2020). Santa Ana's infection rate is 5 times higher than Irvine's and it's mostly due to intersecting factors such as socioeconomic reasons (Gerda). Many residents of Santa Ana are low-income, immigrants that work in the manual labor force, in which COVID can rapidly spread and infect others. Many residents cannot afford to stay home so they risk their lives in order to make money, in comparison to residents in Laguna Beach or Irvine that have jobs in which they can work from home or afford to simply not work. This

situation is made worse by the OC Board of Education in which they voted 4-1 in approval of guidelines to return to school without the need for masks or safety regulations (Biesiada 2020).

On the topic of education, the state tracks students that are chronically absent, meaning if they miss more than 10% of the school year. Santa Ana Unified School District (SAUSD) has a school absentee rate of 7.4%, while other districts in the county like Orange Unified School District have 10.4% (EdSource 2019, see Figure 13). Anything over 10% is considered a high rate, however, students that attend a district such as Santa Ana would be at risk for environmental hazards. More students attend school in SAUSD due to the fact that mostly both parents work and are of low-income, so parents cannot afford daycare services and would rather their children go to school. With the OC's Board of Education new decision, this would disproportionately place students from low-income communities of color at risk of contracting COVID at an alarming rate. On top of this, families from cities like Santa Ana cannot afford to move or cover the costs if damages were to occur to them or their children; placing them further into environmental health hazards.

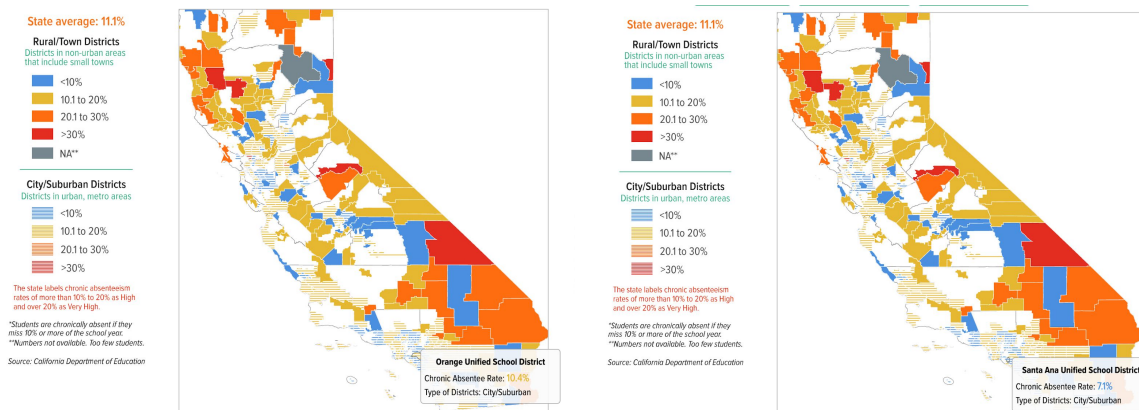


Figure 13. There are several school districts within Orange County, the chronic absentee rate for Orange Unified School District is 10.4% while Santa Ana Unified School District is lower with a rate of 7.1%. The OC's Board of Education latest

approval to allow students to return to school amidst COVID-19 may disproportionately affect low-income communities of color. (Screenshot by Cristabel Portillo, June 2020. Chronic School Absentee Data, *EdSource*, retrieved July 15, 2020).

Other intersecting factors that contribute to the disparities that can be seen within Orange County include drinking water contamination and housing burden. Using Santa Ana as an example again, data from CalEnviroScreen 3.0 concludes that the drinking water contaminant score is 377.39 and the percentile is higher than 40% of the census tracts in California; the percentage for housing burden is higher than 72% for the rest of the state as well (California Office of Environmental Health Hazard Assessment 2018). With these factors and countless others, the residents of Santa Ana do not have time to worry about environmental issues surrounding their county. These factors make them more prone to environmental vulnerability and injustices due to the fact that other factors, such as housing burden, have more personal time and money invested towards them

SECTION 4: Stakeholder Analysis [JiJi Hamdan]

With one of the lowest degrees of readiness to respond to climate-related hazards and at high risk of such events, Orange County is one of the most vulnerable areas in the United States; in fact, Santa Ana ranks as the most vulnerable city in the United States (Tekin 2019). Therefore, it is essential for stakeholders who are contributing to climate change to work to eliminate and prevent the issue to protect communities and various industries from the many disasters it brings rather than continuing to exacerbate the issue.

Although there isn't much statistical research on the amount of pollutants released from each area in Orange County, most of the air pollution in the area has been produced by the factories, refineries, and chemical plants located in Los Angeles (Lindgren 1992). Additionally, according to data from the US Census Bureau, Orange County is one of the most densely populated places in the United States, and "because of their population density, urban and suburban areas will be more susceptible than rural areas to the negative impacts of climate change" (Sforza 2020).

Furthermore, as human activities continue to worsen climate change through carbon dioxide, these emissions in the atmosphere are absorbed by the ocean, resulting in ocean acidification. This issue also results in the bleaching of an incredibly resourceful and biodiverse underwater system: coral reefs. Not only are our marine ecosystems at stake, but ocean acidification affects us as well. Orange County's economy and many residents depend on fishing and consuming seafood. With more acidic oceans comes less available seafood, impacting fishing industries and communities.

Additionally, many residents and property, such as power plants and other structures, are located along the coast of Orange County; this is a huge risk due to sea level rise, which also results from climate change. Scientists warn that sea level

rise and land erosion will gradually sink these structures within the next fifty years (Orange County Coastkeeper 2020). Additionally, sea level rise can result in more severe and frequent floods and storms, emphasizing why it is vital for construction companies and private property owners to prepare for such climate-related risks as soon as possible. Due to these reasons, construction companies are a major stakeholder group in Orange County regarding climate-related risks that have the power to address the situation. The rising temperatures resulting from climate change have continuously made the region more arid and make shrubs and trees drier and more flammable, amplifying fire behavior and size and leading to wildfires. As climate change continues to intensify, the wildfire risk in Orange County continues to increase and make wildfires much more frequent and intense, especially in Santa Ana. Despite the county being especially vulnerable for such environmental hazards, construction companies continue to be allowed to construct new homes in most high-hazard zones, greatly endangering public health.

Similarly, home buyers and private property owners do not consider the potential impact of climate change when searching for or constructing new homes, or even might be unaware of how dangerous the area is. As stated by resident Susan Gorin who lost her home to a wildfire “[w]e’ve pretty much given private-property owners the ability to build a house or a ranch just about anywhere that they own land. And yet the assumption for those private-property owners is that we will have the public fire resources to protect them in case of emergencies and wildfires. Property owners can’t make that assumption any longer” (Barclay 2019). Furthermore, as reported by the New York Times, rather than persuading construction companies and private owners to build homes and structures in safe zones through an incentive system, insurance companies are refusing to renew fire and home liability insurance for homeowners in such areas when they should be encouraging people to move out of such dangerous zones.



Figure 14. Photo of firefighters attempting to extinguish a large wildfire in Santa Ana, California. Unfortunately, this stakeholder group is not capable of quickly putting out the fires and evacuating people due to their lack of equipment and training to deal with such emergency situations. (Photo by Noah Berger by [NBC News](#), December 5, 2017, retrieved July 14, 2020)

To make the situation even worse, as seen in Figure 14, local firefighters and first responders are also major stakeholders as they aren't trained well enough or provided with enough equipment to approach such emergency situations and efficiently evacuate people while effectively extinguishing the fire. There have already been many wildfires in the past and these personnel has proven to be not fast enough to evacuate everyone particularly in the more vulnerable low-income, minority communities (Barclay 2019).

This leads to yet another major stakeholder group: the federal government. Orange County is at very high risk for climate-related hazards, thus it is vital for the federal government to understand and be able to attend to these situations by supporting groups, such as firefighters, through more funding, resources, better training programs, and/or incentive systems.

SECTION 5: Stakeholder Actions [Gerald Lee]

It is important to note that “most fire protection . . . is supported at public expense” meaning that firefighters plus other first responders are purely supported by the government and the public, which itself means a lack of proper training for firefighters (U.S. Forest Service n.d.). As stated above this missing training led to a less efficient evacuation and response, and can prove to be fatal to families not only in losing their homes but to their lives if they are not removed from the disaster in time. Actions to address these issues must come from city leaders and taxpayer money. The city of Placentia in Northern Orange County, CA is already ahead of the game. In 2019 the city made the decision to end their fire fighting services contract with the Orange County Fire Authority (OCFA) and begin their own service because of “cost increases [that the] city leaders said were unsustainable” (Robinson 2020). Today the Fire and Life Safety Department continue to provide response to medical and fire calls as a separate entity to the OCFA, not missing a beat to provide the resources for its community.

However, the sources of fire are multiple and intersect with the risks of industrial production. In January of 2020, scores of neighborhoods in Brea, CA were asked to evacuate after an alkaline-based chemical fire posed a pertinent threat at a nearby chemical manufacturing plant shown in Figure 15 (Salahieh et. al. 2020). The company reported no injuries and speculated there would be no health ramifications for those evacuated (Salahieh et. al. 2020). This incident is from one of the many large manufacturing and refining plants that sporadically litter Orange County, who are massive stakeholders that continue to obfuscate information that implies their environmental liability. Unfortunately, this is commonly the cavalier corporate attitude toward environmental threats that pose immediate attention from the manufacturing, refining, and storing of toxic chemicals in the backyards of Orange County. Without true action to participate in safety and reduction of

chemical release, it is a bomb waiting to go off and be detrimental to the surrounding community.



Figure 15. The Brea Power Plant, owned by Broadrock Renewables. The 2012 report claims the plant is producing greener energy using what they call “hot-dip galvanizing”, also used by a facility in the East Coast (American Galvanizers Association). It emits an unknown visible white gas as it generates power. (Photo from American Galvanizers Association 2012, retrieved July 15, 2020) Source: <https://galvanizeit.org/project-gallery/brea-power-plant>

These manufacturing plants are not the only stakeholders that hide information. Disneyland and the Walt Disney empire are huge stakeholders in Orange County, not exclusively Anaheim, and they've shown it with their massive greenwashing campaigns that insist Disney has gone green (Pearce 2009). A little over a decade ago Disney partnered with Conservation International, rumored to be one of the most corporate-friendly environmental organizations, and

contributed to create the green-facade that the monopoly is fighting for (Pearce 2009). Disney's theme parks are built on the premise that they are destinations in and of themselves, where in the same breath they encourage a trans-Atlantic flight to get a picture with Buzz Lightyear. They also insist that you use a recycling bin at one of their parks. Thus Disney's attempts to appear eco-friendly are nothing more than publicity based concessions to decrease liability while retaining the same level of insidious environmental toxicity with frivolous public displays like their firework shows.

A stakeholder that has decided to make motions improve conditions and information, however, is a coalition of people who created Orange County's Healthier Together. This group rolled out its Outdoor Air Quality Flag Program back in 2004, published in October of 2007 in conjunction with neighboring counties of the Merced County and Tulare County (Orange County's Healthier Together n.d.). The program has already accomplished its motion to "reduce exposure of children (and adults) to outdoor air pollution" in particular attention to asthma triggers and other respiratory disease triggers (Orange County's Healthier Together n.d.). Its effectiveness is yet to be determined and published, however, its actions have already "made teachers and staff more aware of the relationships between air quality and children's health, and made everyone more aware of poor-air-quality days in their community or region" (Orange County's Healthier Together n.d.). Their website also provided open access to demographic information and other documents that relate to Orange County health, a useful tool for other environmental organizations and for public knowledge.

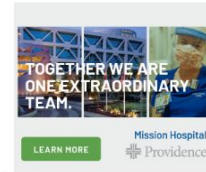
Another group of people is committed to the study of what these chemicals actually do to the human body in efforts to find some science to back the motions to fight climate change. Faculty and students from the University of California, Irvine Center for Occupational and Environmental Health (COEH) have helped to publish and research various items surrounding reproductive, developmental, and

spatial epidemiology statistics with additional research towards working conditions and mental stress due to pollution (COEH). Similarly, the Atmospheric Integrated Research at University of California, Irvine (AirUCI) has targeted research by working more on simulations and solutions, using chemistry and toxicology to help solve issues with climate change and water treatment. The collective effort of the members from both laboratories help contribute to important information that will be beneficial to fighting for a better environment.

SECTION 6: Role of Media and Big Environmental Organizations [Ryan Robinson]

In Orange County, environmental problems that would have serious health impacts do get coverage in the media, but that's only due to the tireless efforts of Environmental Organizations and advocates pushing for acknowledgement. The LA Times published an article in August 2019 depicting the research being done by local action groups and university researchers at UC Irvine (see Figure 16). Researchers work with community groups to assess the lead levels in Santa Ana, and determine if they are over 80 ppm, the level that is considered dangerous for resident's health. The group collected 1,500 soil samples from 500 locations, in order determine sources of lead and analyze how much of soil is hazardous Their solution to the problem of the toxic soil affecting the residents of their town was simple: "[o]nce conclusions are drawn by the coalition, the next step will be how best to educate the public" (Brazil 2019).

   TIMESOC
Toxic soil in Santa Ana? Community groups are working with UC Irvine to find out



LATEST TIMES OC >

Following public outcry, Santa Ana increases police budget and gives more funding to deportation defense fund
July 8, 2020

Ferin Kidd went from prison to fighting for Black voices in Orange County
July 8, 2020

Santa Ana artists take on American democracy in online video series
July 1, 2020

Santa Ana criticized for cutting funding for

Figure 16. (“Toxic soil in Santa Ana? Community groups are working with UC Irvine to find out” by Ben Brazil/LA Times, Aug 23, 2019, retrieved July 15, 2020)

The LA Times has covered climate change in Orange County numerous times while including very important details to consider. A recent article describes how Costa Mesa’s City Council is in support of a climate bill to focus on solutions that reduce carbon emissions (Taylor 2020). The article includes statistical data, background information, and goals of the legislation. The way this topic is covered accurately demonstrates how environmental problems are being handled in the area.

The members of the Orange County Environmental Justice Group make an effort to make sure the people of Orange County have access to the information, also available in English, Spanish, and several other languages, which would affect their health and well-being. The OCEJ is aware that publication of articles is not always enough to convey the urgency of a situation, especially when there is a lack awareness that there is a problem of environmental racism or disparities due to

economic or racial factors. For the soil problem in particular, the article states that the EJ group wants to educate children about the severity of lead poisoning. Due to children being the most vulnerable, they rely on a “comic book that can be used in schools to educate local children about the dangers of lead in the community” (LA Times). The OCEJ group has an action plan, and is working to further educate the public on the dangers and risks associated with environmental hazards. The media needs to draw serious attention to how real the treats are to people’s lives, and it should start with educating younger generations on the modern and present issue which drastically affects society today.

SECTION 7: Recommended Local Actions [Emil Zublin]

Local actions are arguably one of the most effective ways to impact the environmental vulnerability of certain communities. While state and federal level legislation is very important for broad environmental regulations, they will never come close to understanding and solving the variable cornucopia of issues that small communities face on a daily basis. One action that could easily reduce injustices in Orange County would be to start an Environmental Justice coalition which can educate the general public about local issues, stand in solidarity against environmental threats, and most importantly petition their local city councils in order to stop dangerous proposals as well as cleaning up present vulnerabilities. Luckily, the Orange County Environmental Justice organization already exists and is doing its part in fighting against environmental injustices. Formed in 2016, they have surveyed those who are vulnerable, published an analysis of the most important issues, and formed a committee of community leaders to fight against environmental issues (OCEJ). This step is the first of many to establish true environmental justice in Orange County, but there are many more steps to be taken.

In addition, Orange County - particularly Santa Ana - is at huge risk for wildfires, which have been more extreme and frequent due to the continuous magnification of climate change due to human-related activities (Tekin 2019). To minimize this issue, Orange County local governments should provide firefighters and first responders with more funding and resources in order to train staff more effectively, to establish programs so that personnel can address the wildfires and effectively evacuate entire communities, and to provide better equipment to extinguish the fires.

Another action that can be taken in order to reduce environmental vulnerability in Orange County is to fight against the recently proposed Poseidon desalination plant. The proposed Poseidon plant would negatively impact aquatic wildlife, raise water prices, and has the potential to pump “13,000 gallons of oil and grease per day in our ocean. That’s equivalent to an oil spill every single day!” (Maestas 2020). The desalination plant would devastate the surrounding environment and potentially ruin the beaches as well. Not to mention the potential for a fast disaster type incident to occur that could cause much more damage than simple pollution. Along with both of these issues, raising water prices would be terrible for certain Orange County communities. Disadvantaged communities in Orange County (see Figure 17) already face a multitude of environmental issues, and raising water prices would just be the cherry on top for increasing injustices. The community needs to stand up to the Poseidon company and petition for the city council to not allow the plant to be built. If the community came together to fight this plant, the city council would most likely not blatantly go against their constituents wishes. A successful campaign could stop the construction of the plant, saving many lives and tears in the process.

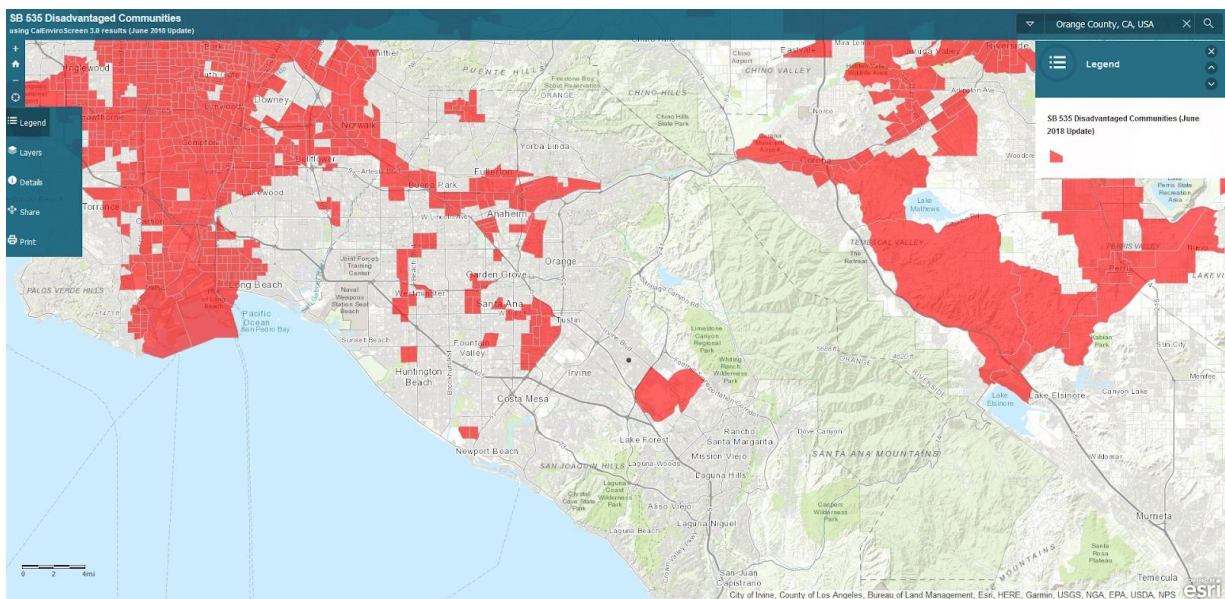


Figure 17. Census tracts in Orange County indicate that they rank in the 75-95 percentile of disadvantaged communities in California. Funding should focus on these communities. By investing in their best environmental interest, such as cleaning up the lead found in soil, could lead to a much lower score and contribute to a much higher quality of life. (Screenshot by Emil Zublin, June 2020. SB 535 Disadvantaged Communities Map, *CalEnviroScreen 3.0*, retrieved June 29, 2020).

However, the most pressing issue in Orange County that requires immediate local attention is the high levels of lead in the soil. In a study conducted by ThinkProgress – a progressive news website –found that in Santa Ana, an Orange County city, a quarter of soil samples taken exceeded federal standards on lead levels deemed harmful (Cabrera, 2017). What is even more alarming is that tested children were found to have 64 percent higher on average lead levels compared to the national average. This issue needs to be addressed immediately.

The health effects of lead are widely known to be very harmful, especially in children. Some local actions that could be taken to address this issue would be to demand that the city administration begin more comprehensive research and begin to explore solutions supported by local scientists and community leaders. Unique community problems require unique community collaboration and fixing the contaminated soil is no easy task. However, Orange County officials must work together with community leaders and organizations to find a solution as quickly as possible. These efforts from many perspectives of environmental justice can overlap and significantly reduce the amount of environmental vulnerability that Orange County faces.

SECTION 8: Recommended Extra-Local Actions

[Fariha Karim]

A county's environmental problems like Orange County's affect not only those residents but also surrounding areas in similar situations, collectively adding to the environmental vulnerability of the state and even the country. L.A., Orange and Fresno counties are singled out to be "among the most polluted counties in the United States" (Fonseca 2020). It's alarming to know that Orange County and nearby counties are among the worst of not only the state but also the entire country. California, as a highly polluted state, and the country needs to work towards protecting and possibly extending the Clean Air Act, encourage fuel efficient transportation, and most importantly properly adapt to climate change.

The Clean Air Act has already benefited the environment in protecting it from more dramatic increases of climate change but there still needs to be an extension of the act, especially under the provisions desired by the Trump administration. The Trump administration is attempting to roll back "limits to air pollution from coal-fired power plants, cars, refineries, pipelines, and more" (Mui et al 2020). This would pose a threat to increasing climate change as it reverses the restrictions it first placed on these pollution sources. As seen in Figure 18, thousands of lives have been preserved along with billions of dollars in monetized benefits. The Clean Air Act is a significant success so far but its benefits can only expand from here. Once the current state of the act is protected, there should be efforts to extend it. It's important to extend the act rather than reverse its impacts in order to properly combat climate change.

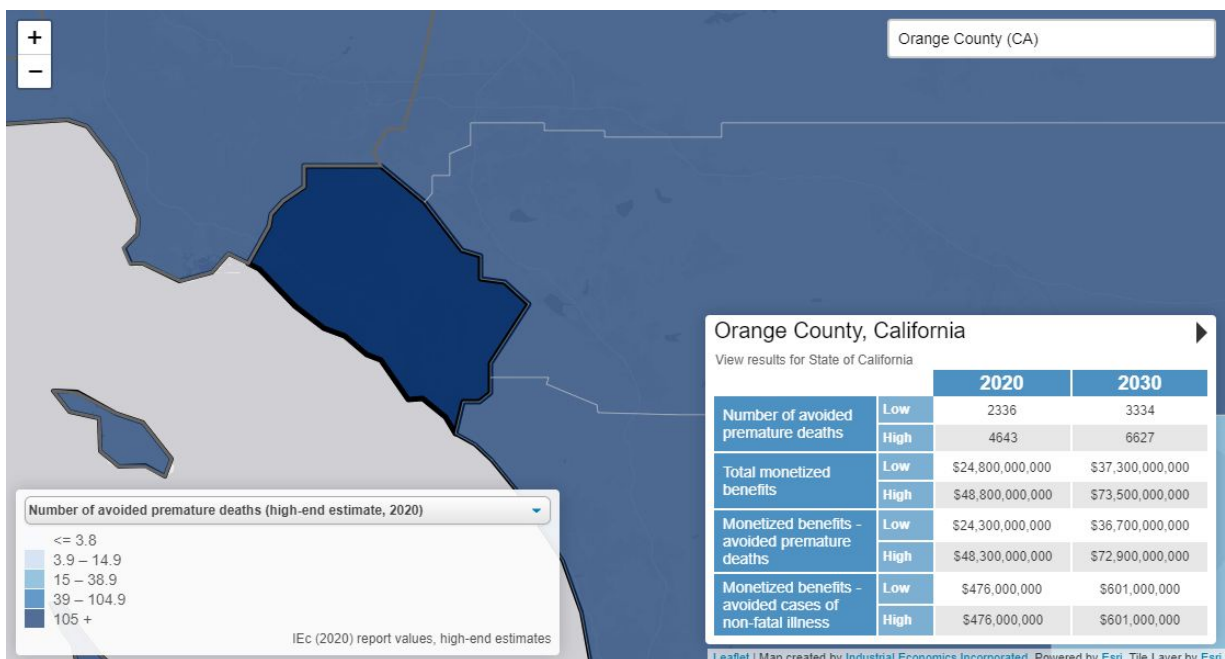


Figure 18. This figure provides an estimate of the Clean Air benefits in terms of current and projected avoided premature deaths and monetized benefits. In a highly polluted county like Orange County, the Clean Air Act substantially helps residents persevere through the consequences of climate change. (Screenshot by Fariha Karim, July 2020. Clean Air Benefits Map, *NRDC*, retrieved July 16, 2020).

As a country, there should be more encouragement of turning to greener alternatives but this can more easily start on a state level. Many individuals in California rely on transportation to get to destinations in a routine manner. These transportation options usually release high amounts of fuel emissions so it would be ideal to instead promote alternatives for more fuel efficient vehicles. The Clean Vehicle Rebate Project (CVRP) “rebates of up to \$7,000 for the purchase or lease” of eligible zero emission vehicles in California (CVRP n.d.). People are able to not only save money but also pollute less while driving. Incentivizing bus, delivery, and other companies that use vehicles that emit more carbon more often to switch to electric or at least hybrid, a large source of transportation emissions would be relieved. Programs such as CVRP should earn more support and promotion in efforts to reduce fuel emissions.

Climate change adaptation is the highest priority action necessary in building resilience to reduce environmental vulnerability. Directly aiding residents is the most important as they are less likely to be prepared to properly handle the surrounding environmental problems. State and federal government leaders need to have action plans to “help communities survive and manage” with insurance, remittances, and other welfare safety nets (Goering 2015). These communities need support and shouldn't have to go through this alone. This type of aid can be dedicated to planning for well structured and protected houses, forming an emergency plan for residents in certain environmental situations, and many more initiatives to prioritize protecting people from environmental vulnerability.

SECTION 9: Recommendations for Future

Research [Zachary Whipps]

Orange county is quite large and covers a diverse array of communities with varying issues. Unfortunately, as with much of southern California, what is often cited as being the greatest environmental threat is the quality of air and the pollutants it contains. Websites such as AirNow and Accuweather provide daily Air Quality Index (AQI) scores for all matters of what has been emitted. With the use of these sites, one can find current information on the severity of Particulate Matter (PM) 10 and 2.5, SO₂, NO₂, Ozone, and carbon monoxide levels. (AirNow, Accuweather)

While this type of knowledge has been accessible to the public, information regarding the nature of air pollution is limited. In other words, we have a ballpark estimate of the amount of pollutants already in the air, but we know little about where this pollution is coming from and in turn how to combat it. This is problematic because the vast majority of plants and refineries do not keep reliable figures on their emissions and their dishonesty leads to a false sense of security. More regulation and accurate monitoring of pollutants is an absolutely necessary step towards a cleaner Orange county.

Needless to say, a significant amount of the pollutants found in the air of Orange county were originally produced in the factories, refineries, and chemical plants of Los Angeles county. Currently, due to technological limitations, there are no comprehensive studies on how pollution created in one area or zip code affects the people living in another. Research concerning the effects of airflow on the spread of pollutants and damage to health will also be needed in the future when drafting regulations and policy. As it stands, people in poorer cities and towns within the same county (Smog) are disproportionately exposed to some of the

worst pollution. While there is some information on this issue, more research must be done on the adverse socio-economic effects of pollution that has in part helped contribute to the abundance of inequality in Orange county. There are laws in place to help with source reduction, such as the Hazardous Waste Source Reduction and Management Review Act. The law requires any entity producing over 12,000 kilograms of “hazardous waste” or just 12 kilograms of “extremely hazardous waste” (Pollution) to release pollution reports every 4 years, and while some oversight is better than no oversight, this policy is only effective when enforced.

Despite the terrible air quality, the condition of Orange county is often overshadowed by neighboring LA county's more dire situation. In 2016, (Perkes 2016) 1,341 people died because of bad air, in Orange County, however, the number was 64. Air pollution has been shown to be responsible for increased rates of cancer, lung damage, and as well as other health problems more benign. The last major study on the effect of air pollution of students in southern California was done in 1996, (Effects) Studies have shown that an increase in air pollution, O3 in particular is strongly correlated with lung disease and skipping school. Overexposure to lead in one's youth has been known to impair one's cognitive abilities, even causing mental retardation in some cases. Poor air quality discourages outdoor activities, this coupled with the advent of consumer electronics, has led to more and more children leading sedentary lifestyles. This had led to higher childhood obesity rates, respiratory illness, and overall poorer health than in counties with better air quality. (Deschenes 2020) A significant amount of progress has been made in the last 25 years regarding hazardous air pollution, so an updated study on pollution's effects on absenteeism and performance is greatly needed to address the communities changing needs.



Figure 19. California High School Student Newspaper Condemns 'Toxic,' 'Goal-Oriented' Mindset. Students filling out surveys on how pollution has affected their lives, both inside and outside of school in order for policy makers to better address their needs. (Photo/Visual by Alan Mastrangelo June 18, 2019, retrieved July 16, 2020. <https://www.breitbart.com/tech/2019/06/18/california-high-school-student-newspaper-condemns-toxic-goal-oriented-mindset>)

SECTION 10: Injustice Analysis [Likang Te]

Due to the globalization of technology and the economy, Climate change has been catalyzed by rising emission rates and greenhouse gases. According to O'brien's article, there were many studies that have addressed the role of global corporations in increasing climate change. The climate is not only impacted by the structural economic changes, but it is also influenced by the current socio-economic trends (O'brien 2000). Can you imagine the temperature of coastal Orange County could be the same as southeast Los Angeles? If the emissions in L.A and Orange are still out of control, the climate of Coastal orange county and Inland Orange County would feel more like southeast Los Angeles and Baja in California. According to Ludwig's post, the temperature of San Clemente will feel more like the weather in Downey in 2080 if we do not act now to protect our environment (Ludwig 2019). In particular, if the emissions are getting worse and out of control, climate change could not stay at their current rates in many places in the world, especially in the United States. This is what the scientists called climate with "no modern equivalent" (Fountain 2019). The horrors of this situation can be seen in Figure 20. There are different kinds of injustices related to climate change in the world. These injustices are also related to economy and health quality.

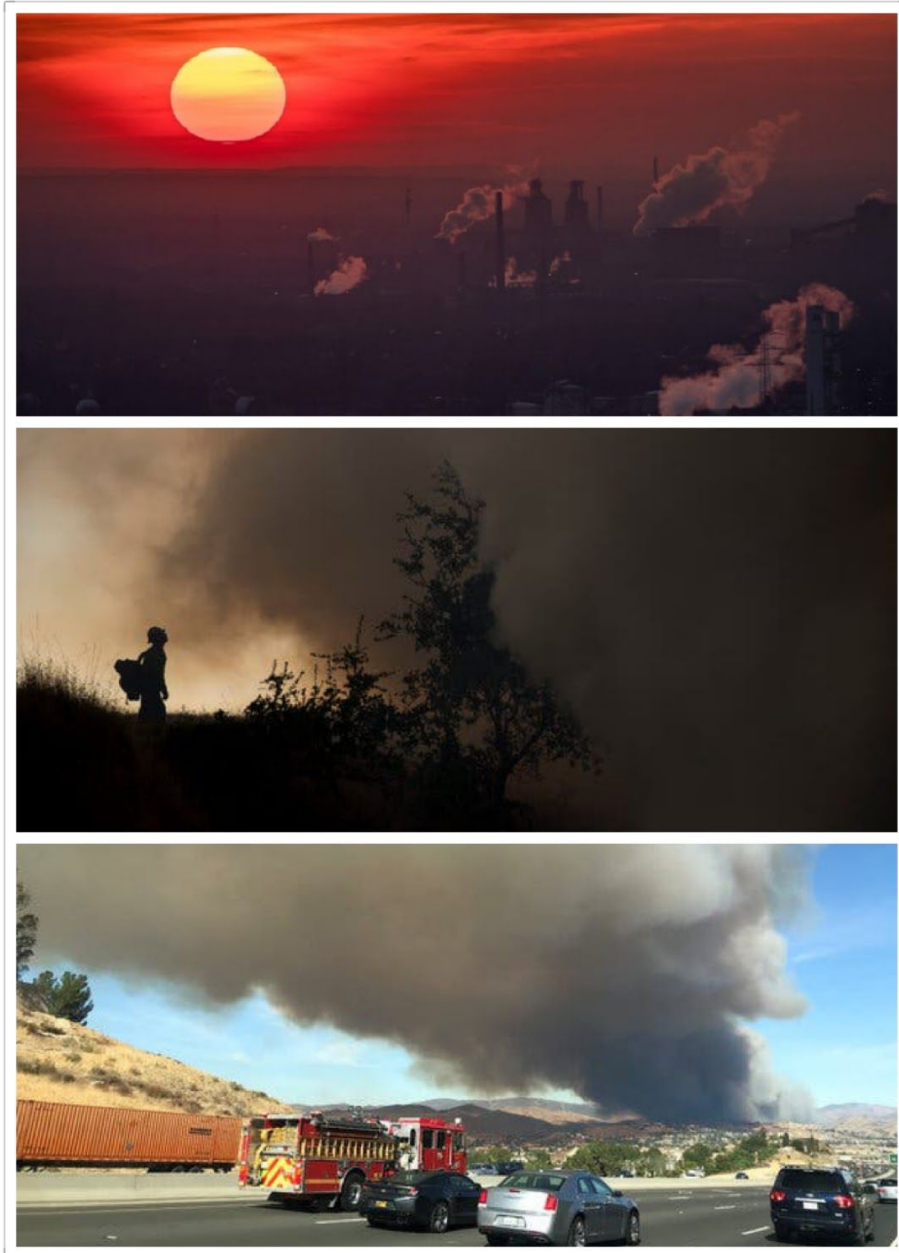


Figure 20. See How Climate Change Will Affect Orange County and How Climate Change Could Shift California's Santa Ana Winds (Photo/Visual by Ludwig and Fountain , 2/15/2019 and 10/28/2019, retrieved 7/16)

The first injustice is economic injustice. The economy will be affected by the influence of climate change. The climate change resulted in the state of Santa Ana wind being less stable. The New York Times described the Santa Ana wind as the

Diablos in the north of California. Because Santa Ana winds began as cold dry wind and moved to a warm, bone-dry, fast-moving air, and it can quickly develop into a full-blown wildfire that damages human assets and resources. Many schools had been closed, and this natural disaster influenced many households in Orange County especially Santa Ana. We can predict what the future of the wind looks like because of the changing climate (Fountain 2019).

The other injustice is health injustice. Orange county's residents' health qualities are also related to climate. During this Covid-19 period, also due to the high crime rate, the residents in this city had a hard time having physical exercise. On the other side, The weather in Orange County is unstable compared to weather history from previous years. As the weather history mentioned, starting from 2010, there were the lowest barometric pressure readings in history in LA and San Diego areas. In Santa Ana, the major health problem of the resident was a chronic disease. Due to the high crime rate, the residents in this city had a hard time having physical exercise (U.S Census 2019). All of these factors are the leading cause of physical inactivity which could increase the rate of chronic disease.

BIBLIOGRAPHY

- "About CVRP." 2020. Clean Vehicle Rebate Project. Accessed July 15.
<https://cleanvehiclerebate.org/eng/about-cvrp>
- AirNow/Announcements. 2020 . Retrieved July 16.
<https://www.airnow.gov/?city=Orange>
- Atmospheric Integrated Research at University of California, Irvine (AirUCI).
"Research" Accessed July 14, 2020. <http://airuci.uci.edu/research>
- Barclay, E. 2019. "This is a worst-possible wildfire scenario for Southern California."
Vox Media. Accessed July 13, 2020.
<https://www.vox.com/2019/9/10/20804560/climate-change-california-wildfire-2019>
- "Benefits of Renewable Energy Use." Union of Concerned Scientists, 2017. c
- Biesiada, Noah. "OC Board of Education Recommends Return To School Without
Masks Or Social Distancing." Voice of OC, July 14, 2020.
<https://voiceofoc.org/2020/07/oc-board-of-education-recommends-return-to-school-without-masks-or-social-distancing/>
- Cabrera, Yvette. "The hidden toxic threat in America's backyards." ThinkProgress,
July 12, 2017.
<https://thinkprogress.org/the-hidden-toxic-threat-in-americas-backyards-aa580bbf61e1/>.
- "CalEnviroScreen 3.0." oehha.ca.gov. Accessed July 15, 2020.
<https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>.
- Calvino, Soledad. "U.S. EPA orders Orange County chemical manufacturer to stop
selling illegal disinfectants." EPA. June 17, 2020.
<https://www.epa.gov/newsreleases/us-epa-orders-orange-county-chemical-manufacturer-stop-selling-illegal-disinfectants>

- Capretz, Nicole. Nicole Capretz to Bill Jacobs. "Recommendations for Irvine Climate Action Plan (CAP)." Climate Action Campaign, September 30, 2016. http://occlimateaction.org/wp-content/uploads/CACLtr_IrvineCAP.pdf.
- CDPH. 2017. "Climate Change and Health Profile Report Orange County." The University of California Davis. California Department of Public Health. February 23. https://www.cdph.ca.gov/Programs/OHE/CDPH%20Document%20Library/CHPRs/CHPR059Orange_County2-23-17.pdf
- Chang, Hetty. "Newport Beach Neighborhood Floods Amid High Surf Advisory." NBC Los Angeles. NBC Southern California, July 5, 2020. <https://www.nbclosangeles.com/news/local/flooding-reported-at-newport-beach/2390706/>
- "Climate Change and Ocean Acidification." Orange County Coastkeeper, June 4, 2019. <https://www.coastkeeper.org/advocacy/climate-change-ocean-acidification/>
- Coker, Matt. "5 Worst Orange County Places Based on State Pollution and Demographic Data" May 6, 2013. <https://www.ocweekly.com/5-worst-orange-county-places-based-on-state-pollution-and-demographic-data-6463041/>
- "COVID-19 United States Cases ." ArcGIS Dashboards. Accessed July 15, 2020. <https://www.arcgis.com/apps/opsdashboard/index.html>.
- Deschenes, O., Wang, H., Wang, S., & Zhang, P. (2020, March 19). The effect of air pollution on body weight and obesity: Evidence from China. Retrieved July 16, 2020, from <https://www.sciencedirect.com/science/article/abs/pii/S0304387820300365>
- "Drinking Water Contaminants ." oehha.ca.gov. Accessed July 15, 2020. <https://oehha.ca.gov/calenviroscreen/indicator/drinking-water-contaminants>.
- "Elected Officials." OCGov (Orange County, California). Accessed July 14, 2020. <https://www.ocgov.com/residents/gov/elected>.

- "Elected Officials." OCGov (Orange County, California). Accessed July 14, 2020. <https://www.ocgov.com/residents/gov/elected>.
- EPA. 2020. "EPA's Environmental Justice Screening and Mapping Tool ." EPA. EPA. <https://ejscreen.epa.gov/mapper/>
- "Environmental Injustice Is Rising in America. And Minorities and the Poor Pay the Price | Mustafa Santiago Ali." The Guardian. Guardian News and Media, December 3, 2017. <https://www.theguardian.com/commentisfree/2017/dec/03/environmental-injustice-rising-in-america-minorities-low-income>.
- Fonseca, Ryan. "Higher Air Pollution Is Linked To A Higher COVID-19 Death Rate, A New Study Finds." LAist. April 7, 2020. <https://laist.com/2020/04/07/coronavirus-air-pollution-harm-harvard-study.php>
- Fountain, H. (2019, October 28). How Climate Change Could Shift California's Santa Ana Winds, Fueling Fires. Retrieved July 16, 2020, from <https://patch.com/california/orange-county/see-how-climate-change-will-affect-orange-county>
- Goering, Laurie. "3 ways to build resilience to climate change." World Economic Forum. September 25, 2015. <https://www.weforum.org/agenda/2015/09/3-ways-to-build-resilience-to-climate-change/>
- Hobert, Ryan. "4 Statistics That Show Why We Need Climate Action to Achieve Sustainable Development." unfoundation.org, August 27, 2018. <https://unfoundation.org/blog/post/4-statistics-that-show-why-we-need-climate-action-to-achieve-sustainable-development/>
- "Housing Burden." oehha.ca.gov. Accessed July 15, 2020. <https://oehha.ca.gov/calenviroscreen/indicator/drinking-water-contaminants>.

- Lead poisoning and health. (n.d.). Retrieved July 16, 2020, from <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>
- Lindgren, K. 1992. "Smog Affects Poor, Young, Nonwhite the Most : Research: Air Pollution Tends to Be Worst in Low-Income Area of Southern California, Economists Claim. Youths Suffer Playing Outdoors." Los Angeles Times. Accessed July 16, 2020. www.latimes.com/archives/la-xpm-1992-05-21-me-548-story.html.
- Lock, S. "Disneyland Anaheim: Daily Attendance 2018." Statista, June 19, 2020. <https://www.statista.com/statistics/236154/attendance-at-the-disneyland-the-me-park-california/>
- Ludwig, A. (2019, February 15). See How Climate Change Will Affect Orange County. Retrieved July 15, 2020, from <https://www.nytimes.com/2019/10/28/climate/santa-ana-winds.html>
- "Map of Orange County." Opportunity Index. Accessed July 15, 2020. <https://opportunityindex.org/>
- Mathews, Jay. "TANKER SPILL THREATENS BEACHES IN CALIFORNIA." The Washington Post. WP Company, February 9, 1990. <https://www.washingtonpost.com/archive/politics/1990/02/09/tanker-spill-threatens-beaches-in-california/d0f26cae-b263-452c-ad5a-b3d00bb785e0/>
- Mui, Simon, Levin Amanda. "Clearing the Air: The Benefits of the Clean Air Act." NRDC. May 5, 2020. <https://www.nrdc.org/resources/clean-air-acts-benefits-map>
- "Native Land." NativeLand.ca. Accessed July 15, 2020. <https://native-land.ca/>.
- NBC Los Angeles. "Five Exposed to Chemical Leak at Water Treatment Plant in Yorba Linda." NBC Los Angeles. NBC Southern California, January 24, 2020. <https://www.nbclangeles.com/news/local/five-exposed-to-chemical-leak-at-water-treatment-plant-in-yorba-linda/2297320/>

- O'brien, K. L., & Leichenko, R. M. (2000). Double exposure: Assessing the impacts of climate change within the context of economic globalization. *Global Environmental Change*, 10(3), 221-232. doi:10.1016/s0959-3780(00)00021-2
- Orange, CA Air Quality Index. (n.d.). Retrieved July 16, 2020, from <https://www.accuweather.com/en/us/orange/92866/air-quality-index/331970>
- "Orange County, California (CA)." Orange County, California detailed profile - houses, real estate, cost of living, wages, work, agriculture, ancestries, and more. Accessed July 15, 2020. http://www.city-data.com/county/Orange_County-CA.html.
- Orange County's Healthier Together. "Orange County Leading Causes of Death". Accessed July 14, 2020. <http://www.ochealthiertogether.org/tiles/index/display?alias=leadingcauses>
- Orange County Coastkeeper. 2020. "Climate Change & Ocean Acidification." Accessed July 13, 2020. <https://www.coastkeeper.org/advocacy/climate-change-ocean-acidification/>
- Pearce, Fred. "Greenwash: Disney Is Greening Its Activities but Not Its Business Model, Says Fred Pearce." *The Guardian*. Guardian News and Media, March 19, 2009. Accessed July 15, 2020. <https://www.theguardian.com/environment/2009/mar/19/disney-greenwash-fred-pearce>
- Perkes, C. (2016, August 11). Deadly air: Thousands killed in Southern California each year by pollution, report finds. Retrieved July 15, 2020, from <https://www.oregister.com/2016/08/11/deadly-air-thousands-killed-in-southern-california-each-year-by-pollution-report-finds/>
- Pho, Brandon. "Santa Ana Council Increases Police Spending but Reallocates Some Money After Protests." *Voice of OC*, July 8, 2020. <https://voiceofoc.org/2020/07/santa-ana-council-increases-police-spending-but-reallocates-some-money-after-resident-protests/>.
- Pinho, Faith. "Laguna Beach Council to Vote on \$103.6-Million City Budget." *Los*

- Angeles Times. Los Angeles Times, June 15, 2019. <https://www.latimes.com/socal/daily-pilot/news/tn-dpt-me-lb-budget-preview-20190615-story.html>
- Polan, Shira. "Common Fireworks Release Lead, Copper & Other Toxic Metals into the Air." NYU Langone News, July 2, 2020. <https://nyulangone.org/news/common-fireworks-release-lead-copper-other-toxic-metals-air>
- Pollution Prevention. (n.d.). Retrieved July 16, 2020, from <https://www.ochealthinfo.com/eh/more/pollution>
- "Poverty." oehha.ca.gov. Accessed July 15, 2020. <https://oehha.ca.gov/calenviroscreen/indicator/drinking-water-contaminants>.
- "Press Releases." OCEJ. Accessed July 14, 2020. <https://www.ocej.org/press-releases>.
- Robinson, Alicia. 2020. "Official Launch of new Placentia fire department is Wednesday, July 1." *The Orange County Register*. Accessed July 15, 2020. <https://www.ocregister.com/2020/06/30/official-launch-of-new-placentia-fire-department-is-wednesday-july-1/>
- Salahieh, Nouran, and Ellina Abovian. "Residents Evacuated After Chemical Fire at Brea Manufacturing Plant." KTLA. KTLA, January 2, 2020. Accessed July 15, 2020. <https://ktla.com/news/local-news/residents-evacuated-after-structure-fire-in-brea-raises-hazardous-materials-concerns/>
- Samenow, James & Freedman, Andrew. 2019. "What's driving the historic California high-wind events, and worsening the wildfires." *Washington Post*. Washington Post. October 28. <https://www.washingtonpost.com/weather/2019/10/28/whats-driving-historic-california-high-wind-events-worsening-wildfires/>
- "Santa Ana City Council Approves \$646 Million Budget." local.nixle.com. Accessed July 15, 2020. <https://local.nixle.com/alert/7355986/>.

Sforza, T. 2020. "Busting the Myth of Orange County's 'Suburban Sprawl'." Orange County Register. Accessed July 16, 2020. www.ocregister.com/2020/02/05/busting-the-myth-of-orange-countys-suburban-sprawl/#:~:text=While%20Orange%20County%20lacks%20a,mile%20than%20did%20Orange%20County.

Smog Affects Poor, Young, Nonwhite the Most : Research: Air pollution tends to be worst in low-income area of Southern California, economists claim. Youths suffer playing outdoors. (1992, May 21). Retrieved July 16, 2020, from <https://www.latimes.com/archives/la-xpm-1992-05-21-me-548-story.html>

Taylor, Bob. "Commentary: Join the Costa Mesa council and members of the O.C. delegation in supporting climate bill." LA Times. June 17, 2020. <https://www.latimes.com/socal/daily-pilot/opinion/story/2020-06-17/commentary-join-the-costa-mesa-council-and-the-o-c-congressional-delegation-in-supporting-climate-bill>

Tekin, E. 2019. "How Climate Change Will Impact Major Cities Across the U.S." Clever. Accessed July 13, 2020. <https://listwithclever.com/real-estate-blog/top-cities-impacted-climate-change/>

The Effects of Ambient Air Pollution on School Absenteeism Due to Respiratory Illnesses: Request PDF. (n.d.). Retrieved July 16, 2020, from https://www.researchgate.net/publication/12190041_The_Effects_of_Ambient_Air_Pollution_on_School_Absenteeism_Due_to_Respiratory_Illnesses

"The CREEC Network." California Department of Education. Accessed July 15, 2020. <https://www.cde.ca.gov/pd/ca/sc/creecnetwork.asp>.

U.S. Census Bureau QuickFacts: Santa Ana city, California. (n.d.). Retrieved July 15, 2020, from <https://www.census.gov/quickfacts/fact/table/santaanacitycalifornia/LFE0412>

- U.S. Forest Service. n.d. "Protecting Residences from Wildfires". United States Department of Agriculture. Accessed July 15, 2020. <https://www.fs.fed.us/psw/publications/documents/gtr-050/introduction.htm>
- University of California, Irvine Center of Occupational and Environmental Health (COEH). "Environmental and Occupational Epidemiology" Accessed July 14, 2020. <http://coeh.uci.edu/research/environmental-and-occupational-epidemiology/>
- Wisckol, Martin. "Coastal Flooding to Steadily Increase, Says New Federal Report." Orange County Register. Orange County Register, July 14, 2020. <https://www.ocregister.com/2020/07/14/coastal-flooding-to-steadily-increase-says-new-federal-report/>
- Xie, Yuxuan. "Interactive Map: California's Chronically Absent Students in 2017-18." EdSource. EdSource, June 5, 2019. Accessed July 14, 2020. <https://edsources.org/2019/interactive-map-californias-chronically-absent-students-in-2017-18/613074>.
- "Yale Climate Opinion Maps 2019." Yale Program on Climate Change Communication, September 17, 2019. <https://climatecommunication.yale.edu/visualizations-data/ycom-us/>.
- "¡Plo-NO! Santa Ana." OCEJ. Accessed July 14, 2020. <https://www.ocej.org/projects>.

FIGURES

Fig. 1 MAP OF COUNTY

Fig. 2 INTERDISCIPLINARY ENVIRONMENTAL INJUSTICE CASE STUDY QUESTIONS

Fig. 3 EPA EJSCREEN: DEMOGRAPHIC DATA

Fig. 4 COUNTY CLIMATE REPORT

Fig. 5 CLIMATE OPINION MAP

Fig. 6 CLIMATE IMPACTED SUPERFUND SITES

Fig. 7 TWO SUPERFUND SITES

Fig. 8 FIRE IN CALIFORNIA COUNTIES

Fig. 9 FUTURE EXTENDED DROUGHT

Fig. 10 CITY CLIMATE RISK AND READINESS RANKING

Fig. 11 MATRIX OF COMPARABLE CITIES FOR CLIMATE RISK AND READINESS

Fig. 12 OPPORTUNITY INDEX FOR COUNTY

Fig. 13 CHRONIC SCHOOL ABSENTEE DATA

Fig. 14 STAKEHOLDER PHOTO

Fig. 15 STAKEHOLDER ACTION PHOTO

Fig. 16 SCREENSHOT OF NEWS ARTICLE ABOUT CLIMATE RISK IN COUNTY

Fig. 17 SB 535 DISADVANTAGED COMMUNITIES IN COUNTY

Fig. 18 CLEAN AIR PROJECTED BENEFITS TO COUNTY

Fig. 19 QUALITATIVE RESEARCH NEEDED

Fig. 20 COLLAGE OF INJUSTICES

APPENDIX

Appendix 1: SKETCH: County Assets

Eij County ASSETS SKETCH		
<p>In this sketch, list and describe assets in your county/community (including people, organizations, social networks, technical infrastructure, public spaces, etc) that can be leveraged to solve problems and develop effective pathways for community development. County assets include libraries, schools and other community spaces, the skills of the people in the county, and their infrastructure (Internet connectivity, transportation, etc). The history of a county can also be an asset, especially if people actively recall it. For ideas, see this University of Memphis resource. For data, see the Civic Data Resources curated for this class.</p>		
Asset	Data source	How is this a county asset?
County Climate Action Plans	http://occlimateaction.org/wp-content/uploads/CACLtr_IrvineCAP.pdf	There is a current plan to control pollution in the county, which helps the people living in OC by having their voices represented.
environmental organizations	https://www.ocej.org/projects	The OCEJ group allows the people of OC to be heard and has resources to help people by pressuring regulations and educating people.
environmental education programs	https://www.cde.ca.gov/pd/ca/sc/creecnetwork.asp	The people of OC can be aware of the dangerous environmental hazards that they could experience, and they learn how to advocate for better regulation.
historical pollution control	https://www.aqmd.gov/home/research/publications/50-years-of-progress	The South Coast AQMD was created by fusing the 1950 district organizations into a single agency to help control pollution in OC.

Appendix 2: SKETCH: Environmental Hazards

EIJ COUNTY CLIMATE HAZARDS SKETCH		
<p>In this sketch, list and provide evidence for diverse hazards associated with climate change in your county. Identify and provide evidence for at least five hazards.</p>		
Hazard type	Data source	county data
wildfire	https://ia.cpuc.ca.gov/fire/map/	Two Tier 3 areas and one Tier 2 area
extreme heat	https://cal-adapt.org/tools/extended-drought/	The average maximum temperature is supposed to increase from 72F in 1960-1990 to 79.2 F in 2050-2070
vehicle pollution (air pollution)	https://ejscreen.epa.gov/mapper/ https://www.latimes.com/science/la-me-freeway-air-20140515-story.html	7300 daily vehicles/meters distance, placing it in the 98% percentile. An article by LA Times finds that freeway pollution from vehicular emissions is significantly higher near Disneyland off the I-5.
ground-level ozone (air pollution)	https://ejscreen.epa.gov/mapper/	48.9 ppb, placing it in the 88% percentile
particulate matter (PM 2.5) (air pollution)	https://ejscreen.epa.gov/mapper/	11.7 ug/m3, placing it in the 97% percentile
sea level rise	https://www.cdph.ca.gov/Programs/OHE/CDPH%20Document%20Library/CHPRs/CHPR059Orange_County2-23-17.pdf https://www.coastkeeper.org/	By 2100, sea levels may rise up to 66 inches. Additionally, according to Orange County Coast Keeper due to climate change sea levels on the Orange County coast are

	org/advocacy/climate-change-ocean-acidification/	expected to rise one foot over the next forty years and four to five feet by the turn of the century.
extreme weather/flooding	https://www.gao.gov/multimedia/GAO-20-73/interactive/ https://www.nbclosangeles.com/news/local/flooding-reported-at-newport-beach/2390706/ (Links to an external site.)	The Ralph Gray Trucking Co. in Westminster is a high flood hazard. An example of climate change eliciting high tides was seen over the fourth of July weekend this year in Newport Beach when the ocean water flooded the posh beachside neighborhood.

Appendix 3: SKETCH: Compound Vulnerabilities

EIJ Intersecting Vulnerabilities Sketch		
<p>In this sketch, list and provide evidence for diverse stresses and vulnerabilities in your county that likely intersect and compound with the stresses of environmental health hazards. Identify and provide evidence for at least five sources of stress and vulnerability. For ideas, see these lists of <u>social determinants of health</u>. The items in the chart below are examples that you can build on (but you don't have to).</p>		
county stressor	Data source	Evidence of county stress
COVID-19 rates	https://www.arcgis.com/apps/opsdashboard/index.html#/409af567637846e3b5d4182fcd779bea https://www.latimes.com/projects/california-coronavirus-cases-tracking-outbreak/orange-county/ https://voiceofoc.org/2020/07/oc-board-of-education-recommends-return-to-school-without-masks-or-social-distancing/	<ul style="list-style-type: none"> -In the top 20 confirmed COVID-19 cases in the nation -over the past 2 weeks, it has recorded 12,107 new cases, failing the standard for disease transmission -OC board of education votes 4-1 in approval of returning to school without masks or safety regulations -Will disproportionately affect low-income students of color that will return to school

Opportunity Index	https://opportunityindex.org/	<p>-overall the scores were higher for the average state and national score</p> <p>-health score was lower than average for state score though</p> <p>-It is taking account orange county as a whole though, so it cannot be used to generalize cities that can be doing worse or better</p>
School Absentee Data	<p>https://edsources.org/2019/interactive-map-californias-chronically-absent-students-in-2017-18/613074</p> <p>https://edsources.org/topic/chronic-absenteeism</p>	<p>-orange unified school district 10.4%</p> <p>-santa ana unified school district 7.1%</p> <p>-state labels chronic absenteeism rates more than 10% as high</p> <p>-more vulnerable bc they can't afford childcare much less to move or cover damages if an environmental hazard were to occur.</p>
Crime	https://www.crimemapping.com/map/ca/losangeles	<p>A lot of crime, especially in parts of Santa Ana and Anaheim.</p> <p>Crimes such as: -Assault, disturbing the peace, weapons violation, burglary, fraud, narcotic violation, grand theft, and more.</p>
CalEnviroScreen 3.0	<p>https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30</p> <p>https://oehha.maps.arcgis.com/apps/View/index.html?appid=c3e4e4e1d115468390cf61d9db83efc4</p>	<p>-Santa Ana: 6059075002</p> <p>-Pollution Burden 78%</p> <p>-included in disadvantaged communities</p> <p>-Laguna Beach: 6059062605</p> <p>-Pollution Burden 22%</p>
Drinking Water Contaminants Census Tract	https://oehha.ca.gov/calenviroscreen/indicator/drinking-water-contaminants	<p>-Santa Ana: drinking water contaminant score for this census tract is 377.39, drinking water contaminant percentile is higher than 40% of the census tracts in California.</p>
Poverty Census Tract	<p>https://oehha.ca.gov/calenviroscreen/indicator/poverty</p> <p>https://local.nixle.com/alert/7355986/</p>	<p>-Santa Ana: the percent of people living below twice the poverty level is higher than 93% of the census tracts in California.</p>

	https://voiceofoc.org/2020/07/santa-ana-council-increases-police-spending-but-reallocates-some-money-after-resident-protests/ https://www.latimes.com/socal/daily-pilot/news/tn-dpt-me-lb-budget-preview-20190615-story.html	<p>-1,941.5 per resident, budget is 646 million</p> <p>-there is not much money that is being allocated towards environmental issues.</p> <p>-Recently, santa ana council increased their police spending</p> <p>-Laguna Beach: The percent of people living below twice the poverty level is higher than 11% of the census tracts in California.</p> <p>- 4,709 per resident, budget is 108.4 million</p>
Housing Burden Census Tract	https://oehha.ca.gov/calenvirosc reen/indicator/housing-burden	<p>-Santa Ana: the percent housing burdened is higher than 72% of the rest of the state.</p>

Appendix 4: SKETCH: Stakeholder Analysis

Stakeholder Analysis Sketch		
<p>In this sketch, list diverse environmental injustice stakeholders in your county in the center column. In the left column, list catalysts -- things (money, honorable reputation, etc) that <i>enable</i> this stakeholder group to get what they want. In the right column, list corrosions -- things (lack of money or status, youth, gender, poor organizational skills) that <i>undermine</i> this stakeholder group's capacity to get what they want. In sketching this, you quickly draw out who has power, who doesn't and where change might be possible (or difficult).</p>		
"catalysts"	stakeholders	"corrosions"
Money, authority	Factory owners	Reputation among health officials, residents (especially those in more vulnerable communities), environmentalists

Money, authority	Construction companies	Limited by rules and regulations by the law as well as residents
Good reputation to protect communities	Local firefighters	Lack of equipment and funds by government
Authority and power to make decisions since they pay property taxes	Private property owners	Building in high-risk zones means there is much potential for property damage and endangering public safety
Support residents with money as necessary but can also refuse to renew insurance to regain their losses	Insurance companies	Reputation among residents and private property owners through lack of support when it's needed the most
Authority, political power, and money	Federal government	Inability to handle climate-related risks and provide necessary protection, funding, and resources
Strength in numbers	Residents	Lack of influence on the federal government to implement change to protect themselves from environmental hazards, sometimes even unaware of the dangerous situations, powerless individually

Appendix 5: SKETCH: Stakeholder Actions

Eij Stakeholder Action Sketch		
<p>Building from the “Stakeholder Analysis” Sketch, use this sketch to list stakeholders in environmental injustice in your county, their actions, and their failures to act. This sketch may be difficult to complete. Fill in at least five stakeholders and as many of the other boxes as you can.</p>		
Stakeholder	What actions have this stakeholder taken to address environmental injustice in this county?	What actions have this stakeholder NOT taken to address environmental injustice in this county? (Provide evidence)
Orange County Transportation Authority (OCTA)	<p>Funds Environmental Cleanup Programs Tier 1 and 2. Source</p> <p>Also studying how climate change affects the rails and how the rails are going to change to combat climate change. Source</p>	Actively performing climate change, not necessarily climate change mitigation.
electricity companies	N/A	Looked into Coastline Electric and Semper Solaris, neither of which provide any evidence that their energy is green, with an assumption that can be made that it is slight greenwashing
environmental organizations	Orange County’s Healthier Together provides demographic information and open access documents.	N/A

	In addition they have partnered with neighboring counties to complete projects and awareness.	
University and students	UCI has various laboratories and faculty and student support to run studies and solve solutions in climate change.	N/A
Disney Company (Ciara Hernandez contribution)	N/A	Use of greenwashing to make a false image of being green despite being an amusement park which uses fireworks, gas to power the rides, produces a lot of consumption, etc.
Brea Manufacturing Plant and other similar companies (Ciara Hernandez contribution)	N/A	Failure to give information on reports and obscures health ramifications and other threats in the storage of toxic items.
People and Property owners living in hazardous zones (Jiji Hamdan contribution)	N/A	Private property owners fail to recognize the high hazard zones and still build houses on wildfire prone areas.
Fire-fighters and other first responders to natural disasters (Jiji Hamdan contribution)	N/A	Firefighter response time has been repeatedly slow and need to be better equipped and prepared to evacuate residents, particularly in lower income areas.

Appendix 6: SKETCH: Media & Enviro Org Coverage

Eij MEDIA & ENVIRO-ORG COVERAGE SKETCH

Use this sketch to assess the coverage your county has received from big media and environmental organizations. Include the LA Times in your search, and at least five large environmental organizations from [this list](#) (selecting the most likely ones for your search). Also include local media outlets and environmental organizations if you can find information about these. For each media or environmental organization, identify a series of articles they have published or actions they have taken in different years over the last decade.

Also analyze how Wikipedia covers your county. Check to see if environmental hazards and problems are mentioned in the Wikipedia article about your county. Also check the “talk” tab to see if readers have discuss environmental problems.

MEDIA OR ENVIRO-ORG: Orange County Environmental Justice

url: <https://www.ocej.org/>

- **YEAR:** 2020 **ARTICLE or ACTION:** Grounding in the Uprising
- **YEAR:** 2019 **ARTICLE or ACTION:** Communities Organizing for Better Water
- **YEAR:** 2019 **ARTICLE or ACTION:** ¡Plo-NO! Santa Ana
- **YEAR:** 2020 **ARTICLE or ACTION:** COVID-19 Intervention
- **YEAR:** 2020 **ARTICLE or ACTION:** Social Media Outreach

MEDIA OR ENVIRO-ORG: LA Times

url: www.latimes.com

- **YEAR:** 2019 **ARTICLE or ACTION:** Toxic soil in Santa Ana? Community groups are working with UC Irvine to find out
- **YEAR:** 2020 **ARTICLE or ACTION:** Tracking the Corona Virus in Orange County
- **YEAR:** 2020 **ARTICLE or ACTION:** Corona Virus Opens new testing sites
- **YEAR:** 2020 **ARTICLE or ACTION:** Back to School Without Masks?

MEDIA OR ENVIRO-ORG: OC Register

url: www.ocregister.com	
<p>YEAR: 2020 ARTICLE or ACTION: Coastal Flooding will steadily increase</p> <ul style="list-style-type: none"> YEAR: 2020 ARTICLE or ACTION: Clean up in NewPort beach after flooding 	
MEDIA OR ENVIRO-ORG: Environmental Health url: https://www.ochealthinfo.com/eh	
<ul style="list-style-type: none"> YEAR: 2020 ARTICLE or ACTION: CUPA Aboveground Petroleum Storage Act Program YEAR: 2020 ARTICLE or ACTION: Hazardous Materials Business Emergency Plan (HMBEP) 	
Wikipedia: https://en.wikipedia.org/wiki/Orange_County,_California	
<p>How are environmental problems mentioned (or not mentioned) in the county's Wikipedia article? You can also check the article in other languages (Spanish, for example).</p> 	<p>Are environmental problems discussed on the talk page of your county's Wikipedia article? If yes, which issues do users discuss?</p> 
<p>Yes.... / No While global warming or environmental hazards are not mentioned, there is a climate section</p>	<p>Yes.... / No No mention of environmental problems</p>

Appendix 7: SKETCH: Possible Local Actions

<p>Eij LOCAL ACTIONS SKETCH</p> <p>Use this sketch to chart out problems associated with climate change, solutions that have been proposed or implemented in other places, and possible ways</p>

these solutions could be **implemented** in your county.

Focus on actions that can be carried out locally, based on local decision-making and political authority. Many problems that you identify should be in this sketch and in the sketch focused on extra-local actions (the middle and right columns would be different). Try to identify possible solution pathways at both levels (by putting problems you have identified on both sketches).

Fill in at least ten boxes in the sketch (not necessarily a full row). It is okay to identify problems that you don't yet have solutions to, or possible solutions that you don't yet know how to leverage or implement at the local level. Add additional rows if needed.

County:

Identify a problem.	Identify ways this problem is being addressed in different places -- through educational programs, legal actions, land use policies, media campaigns, etc.	Tailor these solutions to your county.
Residents live in high risk wildfire zones.	Buy-outs	Some level of guaranteed house insurance for Orange County residents
No restrictions on where people can build homes.	Zoning laws can reduce the amount of in-danger homes	Local government in Orange County can easily pass these zoning laws for the good of the residents
Lead found in soil	Collecting data and research to categorize and see full scope of dangers	OCEJ and UC Irvine are working together already to test and document the amount of lead exposure in the soil
Desalination plant could lead to environmental	Community-led protests could halt construction	Protests could lead to Orange County officials

injustices		not allow the Poseidon salination plant to be built
------------	--	---

Appendix 8: SKETCH Possible Extra-Local Actions

Eij EXTRA-LOCAL ACTIONS SKETCH

Use this sketch to chart out problems associated with climate change and proposals for mitigation and adaptation.

Focus on actions that would be taken *away* from the county (at state, federal or international levels) that could be implemented or would have positive impacts at the county level. Many problems that you identify should be both in this sketch (focused on extra-local actions) and in the sketch focused on local actions (the middle and right columns would be different). Try to identify possible solution pathways at both levels (by putting problems you have identified on both sketches).

Fill in at least ten boxes in the sketch (not necessarily a full row). It is okay to identify problems that you don't yet have solutions to, or possible solutions that you don't yet know how to leverage or implement at the local level. Add additional rows if needed.

County: Orange County

Identify a Problem	Identify ways this problem is being addressed through state, national and international initiatives.	Tailor these solutions to your county.
CA (state) plans for energy transition (away from fossil fuels)	Provide cost efficient alternatives to fossil fuels in easy, accessible methods	Promote fuel efficient vehicles to substantially reduce fuel emissions from transportation
Trump Administration plans to rollback on limits	Activism against rollbacks	Residents can reach out to their representatives

to air pollution in the Clean Air Act		and express the importance
Communities aren't prepared to face the consequences of climate change	State and federal efforts to financially support affected individuals	Target financial support to community members
Climate change mitigation isn't prioritized	Education systems that enforce the importance of combating climate change	Community members can learn about what specific environmental problems affect them

Appendix 9: SKETCH: Data & Qualitative Research Design Proposal

Eij RESEARCH RECOMMENDATIONS SKETCH	
<p>Use this sketch to chart out research that needs to be done to better characterize and address the climate change and hazards in your county. In the first section of the sketch, identify quantitative research needed to better understand climate change in your county. In the second section of the sketch, propose a qualitative study that includes three methods widely used by anthropologists: participant-observation, interviewing and focus groups. See tips for rapid design of a qualitative study here.</p>	
RECOMMENDED QUANTITATIVE STUDIES	
What kinds of pollution research are needed in this county?	<p>How Orange county has been affected by the pollution generated by LA County</p> <p>How reliable are the figures presented by the industries in Orange county regarding environmental integrity.</p>
What kinds of health research are needed in this county?	<p>How pollution over time has altered the amount of people with respiratory and body conditions, and its effects on social mobility.</p>
What kind of quantitative social survey data is needed in this county?	<p>Update statistics and figures on how pollution affects student's academic</p>

performance and experience.

RECOMMENDED QUALITATIVE STUDY

- What is your research question? How does environmental pollution affect the academic prospects of the youth in Orange county?
- What social groups will you study and interact with? The youth of Orange county, with a focus on students in less affluent cities and zip codes.
- How will you gain access to the social groups you'll focus on? What privacy protections will be needed? Through working with school districts and communities, information will be gathered through surveys and school records. These surveys are anonymous, with zip code and school name being used to sort out the information collected.
- How could you use participant observation to answer your research question? With the results of the county wide survey, we will be able to begin to paint a more accurate picture of how things have changed in the last 25 years and what still needs improvement.
- How could you use in-depth interviewing to answer your research question? What questions would you ask? We would conduct in depth interviews with a small amount of students to gather anecdotal accounts of how pollution has affected their lives scholastically.
- How could you use focus groups to answer your research questions? What discussion prompts could you use? Questions on the survey and in interviews are meant to see how pollution has personally worsened their academic experience. The vast majority of statistics and figures will be pulled from hospital and school records, but discussion prompts are meant to attach a face to the people affected.
- Who would find this research useful? School districts and policy makings wishing to better the communities in which they serve.

Appendix 10: SKETCH: Multiple Forms of Injustice

EIJ INTERSECTING INJUSTICES SKETCH

Use this sketch to chart out the many forms of injustice that intersect and compound to produce environmental injustice.

Type of environmental injustice	Example	Actions or research needed to respond to this type of environmental injustice.
ECONOMIC INJUSTICE: Does poverty or uneven wealth exacerbate environmental hazards in this setting?	Santa Ana winds caused many wildfires that destroyed many properties.	Control the emission to protect the climate and stabilize the Santa Ana winds.
HEALTH INJUSTICE: Are there health disparities or uneven access to health care in this setting?	Covid-19, Crime rate and the Climate impact the rate of resident's physical activity.	Protect the climate, wear mask and add police officers to increase residents' physical activity rate.

Permission To Publish @ https://disaster-sts-network.org Do you consent to having your name listed as an author on the published case study?	
Name	Publish? (Y or N)
1. Gerald Lee	Y
2. Ryan Robinson	Y
3. Cristabel Portillo	Y
4. Ciara Hernandez	Y
5. Jiji Hamdan	Y
6. Emil Zublin	Y
7. Supriya Dadi	Y
8. Likang Te	Y

9. Zachary Whipps	Y
-------------------	---