

IMPERIAL COUNTY

COMBO DISASTER
CASE STUDY



ENVIRONMENTAL
INJUSTICE

SUMMER 2021

GROUP NO. INTERNS

AUTHORS

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ABOUT

This case study report was developed by students at the University of California Irvine for the undergraduate class, “Environmental Injustice,” taught by Kim Fortun, Tim Schütz, Kaitlyn Rabach, Prerna Srigan and Maggie Woodruff for the Department of Anthropology, Summer 2021.. The University of California Irvine is on the ancestral homelands of the Tongva and Acjachemen nations.

COVER PHOTO

Photo of stagnant water at the Salton Sea taken by Kim Stringfellow in 2000.

BIOGRAPHICAL STATEMENT	PHOTO
<p>Noelle Chin is a fourth year anthropology major at California State University, Long Beach. She is currently interested in the role of agri-food politics in human and environmental health.</p>	 A close-up portrait of a young woman with long, dark, wavy hair, smiling warmly. She is wearing a dark jacket. The background is slightly blurred, showing green foliage.
<p>Clara Carrabba is a senior at Memorial High School in Houston, Texas. After high school, she plans to attend a four year university and pursue a career in journalism.</p>	 A young woman with long, wavy blonde hair, smiling. She is wearing a white denim jacket over a light-colored top and a tan skirt. She is standing on a wooden walkway with a blue railing, overlooking a beach and the ocean under a sunset sky.

Brenda Vuong is a second year Environmental Science & Policy Major at the University of California, Irvine. Her current interests revolve around clean energy and global sustainability. She hopes to continue her environmental studies education in graduate school or enter the working field for sustainability.



June Su is a junior at University High School in Irvine, California. After high school, she plans on going to a four year college majoring in sociology or psychology with a minor in fine art, and then going to graduate school to further pursue a career in academics.



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Katherine Wu is a junior at University High School. After high school, she hopes to continue on to higher education and pursue her interest in medicine and health policy.



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Lena Fortun is a junior at University High School in Irvine, California. After graduating high school, she plans on attending a four year university and plans to focus on biology and health policy. She hopes to work abroad and work to improve health infrastructures around the world.



Yvonne Wen is a junior Environmental Engineering major at the University of California, Irvine. She is interested in just transitions and hopes to help with environmental injustices with her engineering skills in her future career.



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INTRODUCTION

This case study report focuses on climate change and the array of environmental hazards it creates and intersects with in Imperial County.

Climate change causes both fast and slow disasters: Climate change is linked 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 case study highlights ways climate change is hitting poor and politically marginalized communities hardest. It also describes how climate change produces many intersecting injustices, which together produce environmental injustice. [Intergenerational injustice](#) is a particularly important result of climate change. Intergenerational injustice occurs when decisions and actions by people in one generation (people today, for example) lower the life chances and well-being of people in the future.

The report addresses a series of ten questions (Fig. 2) 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.

ENVIRONMENTAL INJUSTICE CASE STUDY FRAMEWORK

1. What is the setting of this case? What are its assets?
2. What environmental health threats (from explosions, everyday 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 environmental problems in this setting been reported by media, environmental groups, companies and government agencies?
7. What local actions would reduce environmental vulnerability and injustice in this setting?
8. What extra-local actions (at state, national or international levels) would reduce environmental vulnerability and injustice in this setting and similar settings?
9. What kinds of data and research would be useful in efforts to characterize and address environmental threats in this setting and similar settings?
10. What, in your view, is ethically wrong or unjust in this case?

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

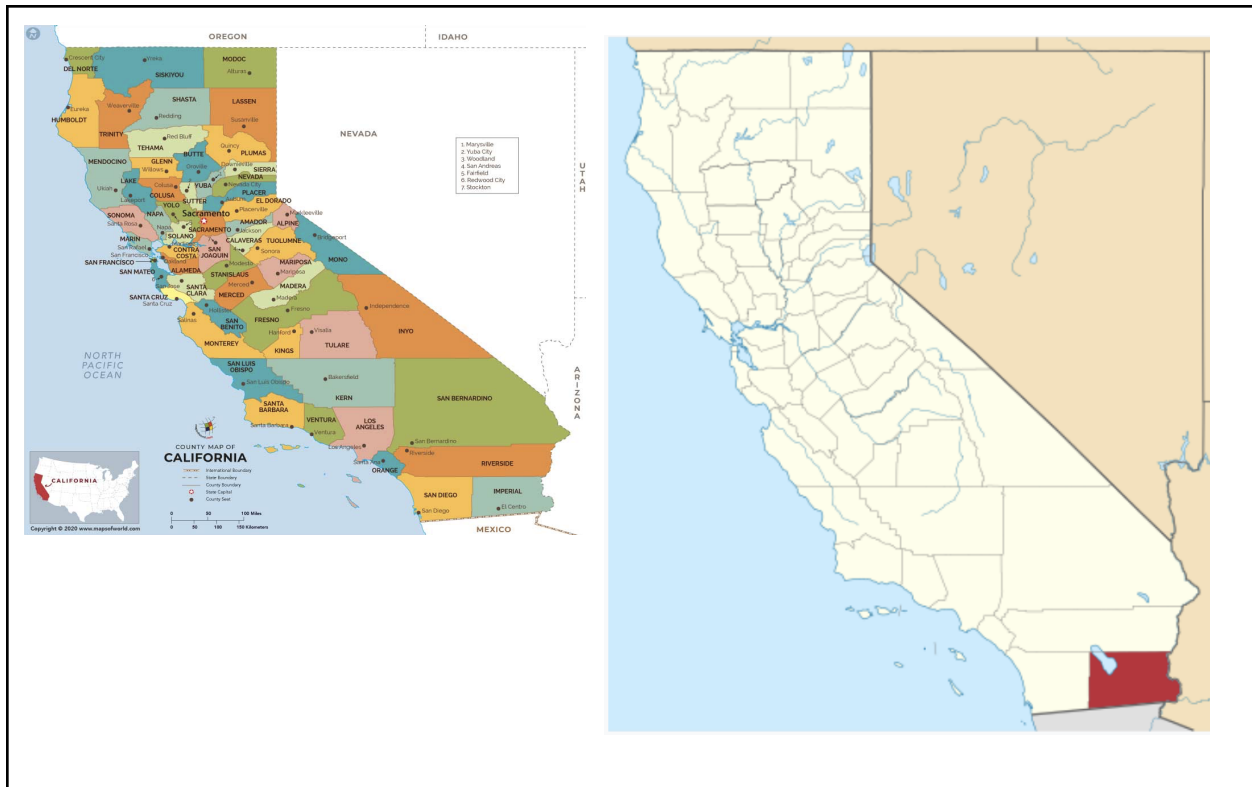


FIGURE 2: Imperial County is located in the very most southeastern region of California bordering Mexico and is known for its prosperous agricultural industry. According to Inside Climate News, the agricultural industry in Imperial County will be impacted by climate change; the increased heat will lead to a higher insect population, causing more diseases to be spread and farmers to use more pesticides for pest control, contributing to local air and water pollution (Gross 2021).

<https://www.mapsofworld.com/usa/states/california/california-county-map.html>

https://en.wikipedia.org/wiki/Imperial_County,_California

(Screenshots by Khira Pearlstein, June 29, 2021)

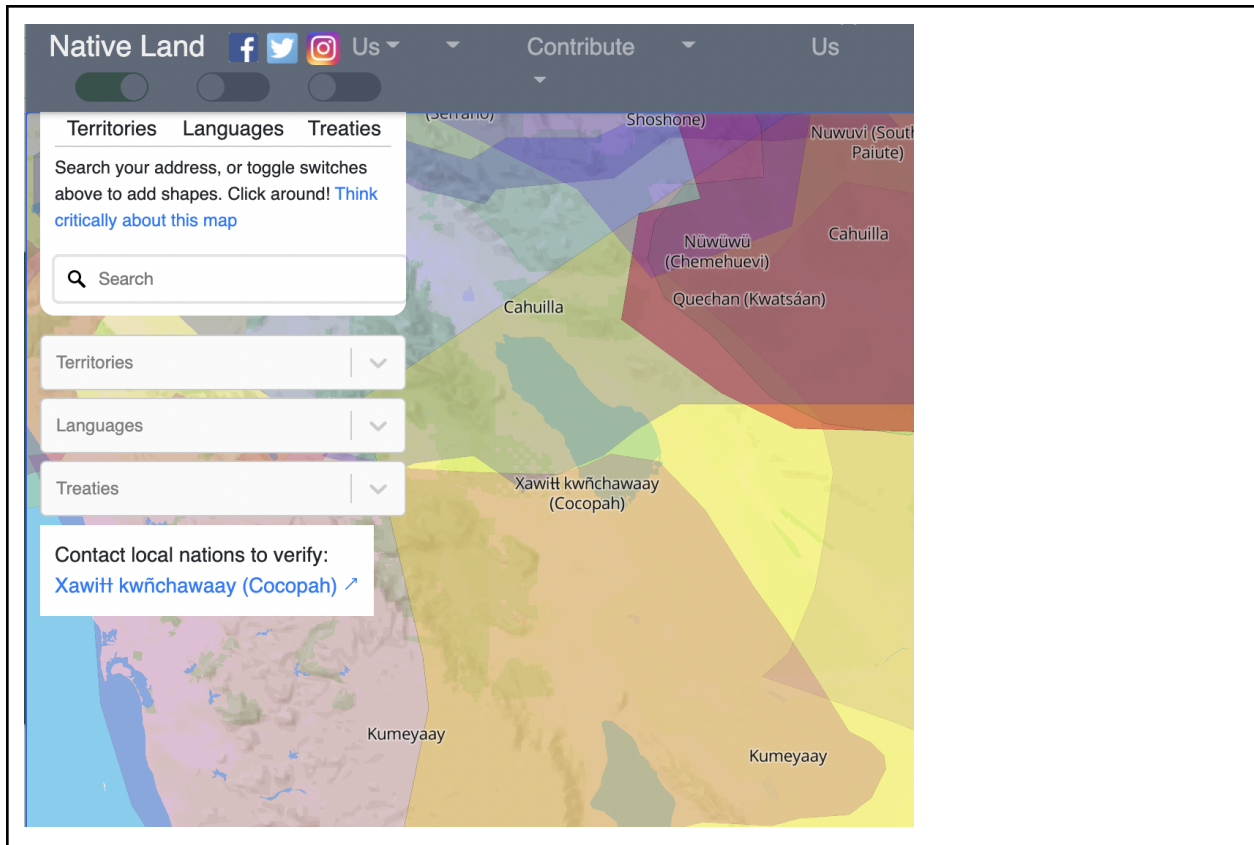


FIGURE 3: Imperial County is located on the Quechan Indian Tribe, Xawitł kwñchawaay (Cocopah).
<https://native-land.ca/> (Screenshot by Noelle Chin, July 14, 2021)

1. COMMUNITY ASSETS & SETTING

The Agricultural Poster-child

Brenda Vuong

Set in Imperial County, this case study revolves around one of the “newest” counties in the state of California. Despite its late establishment in 1907, it is the ninth largest California county with approximately 180,000 residents (“Imperial County California” 2017). Nearly 85% of those residents identify as Hispanic or Latinx and many are also U.S. citizens. However, despite U.S. citizenship, the majority of the county’s residents are treated as foreign visitors with unequal workers’ rights. In combination with agriculture driving the county’s local economy, many Hispanic residents not only live in an industrialized farm land but they also depend on employment as longtime farmworkers.

Imperial County has become a poster-child for the hardships of many Latinos facing poverty, low-paying jobs, and poor nutrition in comparison to non-Hispanic Americans. Moreover, the U.S. Census taken in 2019 has deemed 22% of Imperial County’s persons in poverty (U.S. Census Bureau 2019). Specifically, the community’s farmworkers, who have continuously struggled with low wages, inadequate housing, and obstacles to healthcare, have felt the most consequences of those worsening conditions during the COVID-19 pandemic. Besides the pandemic, climate change is also a prominent issue affecting the

region as the Salton Sea, a landlocked body of water in Imperial County with a high salt concentration, has been drying up. As a direct result of this evaporation, there is a greater risk of dangerous dust storms developing in the region. In terms of climate change beliefs, 77% of Imperial County residents believe in global warming, while 61% find themselves considering a presidential candidate's stance on climate change on their vote ("Yale Climate Opinion Maps" 2020). These statistics suggest that some residents may not be fully informed on the effects of climate change on their community, or that their view on climate change does not take precedence over other voting factors (Figure 8).

Imperial County also has a multitude of community assets used to solve issues and further development. For environmental organizations, Comite Civico del Valle stands out as a 501 (c)(3) environmental justice organization dedicated to informing, educating, and engaging the community's civic participation (Figure 7). Additionally, Imperial County has an established cooling center to prevent hyperthermia caused by heat, humidity, and poor air quality during a heat wave. The COVID-19 pandemic has proved to be a challenge for these cooling centers, as many are closed until further notice (public health). Cooling centers continue to be a crucial part of Imperial County's assets, as many impoverished families reside without proper air conditioning, shade, and other hot weather necessities.



FIGURE 4: Waterfowl on Cibola National Wildlife Refuge, USA. Along with these water bodies, several important backwaters are home to many wildlife species that reside in this Yuma Desert portion of the Sonoran Desert.
Chris M. Morris (Screenshot by Diana Kou, July 14, 2021)

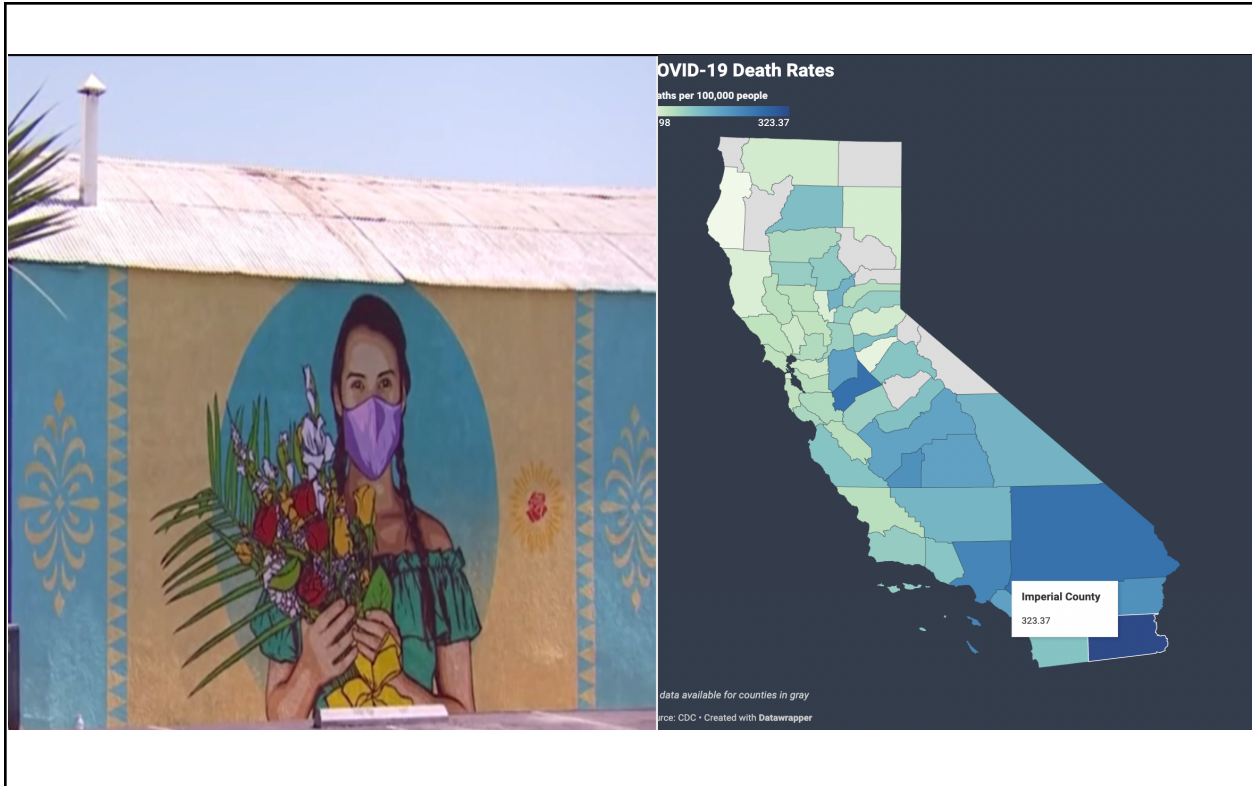


FIGURE 5: A mural was recently painted in El Centro to memorialize those who have lost their lives to COVID-19 pictured next to a map of COVID-19 death rates showing Imperial County as the most impacted.

<https://www.nbcсандiego.com/news/coronavirus/covid-19-death-rate-disparities-a-look-at-the-hardest-hit-communities/2644640/>

(Screenshot by Noelle Chin, July 14, 2021)

Climate Change and Health Profile Report Imperial County



February 2017

FIGURE 6: This report was supported by the Centers for Disease Control and Prevention (CDC) Cooperative Agreement and the California Department of Public Health – Office of Health Equity. The report examines climate change and its impact on the health of Imperial County residents, as well as projections for different environmental hazards.

https://www.icphd.org/media/managed/healthinformationandresources/CHPR025Imperial_County2_23_17.pdf (Screenshot by Diana Kou, July 14, 2021)

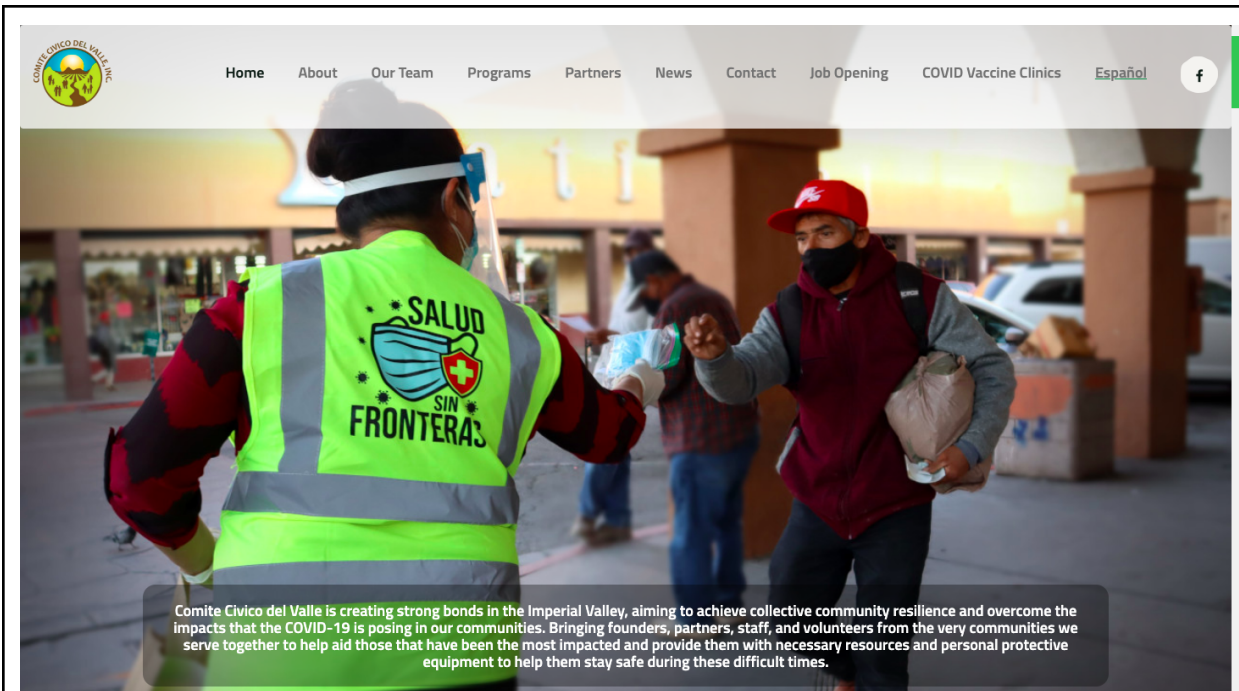


FIGURE 7: Comitè Civico del Valle (CCV) was founded on the principle that “informed people make healthy decisions,” and continues to incorporate this mission statement in all partnerships, research studies, and civic engagements initiated or composed by their organization. With over three decades of serving the communities of Imperial Valley in their arsenal, Comitè Civico now also serves various California communities collaboratively with other established environmental justice organizations, researchers, academia, and government agencies.

<https://www.ccvhealth.org/index.php> (Screenshot by Diana Kou, July 14, 2021)

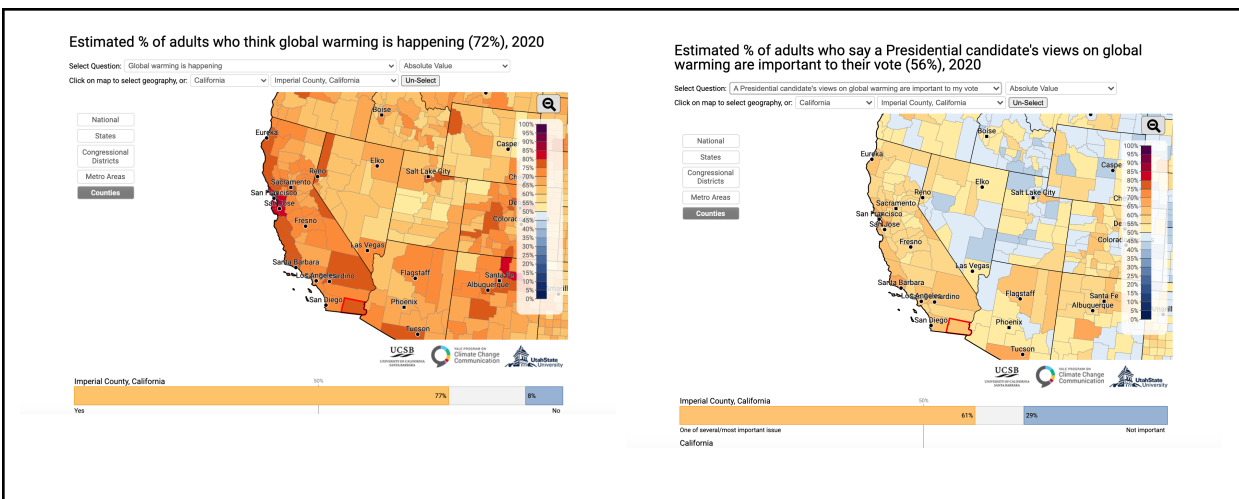


FIGURE 8: This Yale Climate Opinion Map and associated data indicates that 77% of the people in Imperial County, California think that global warming is happening, but only

61% say that a Presidential candidate's views on global warming are important to their vote. This indicates that while many Imperial County residents believe in climate change, less of them see the importance of the president addressing it; this could be because they haven't been directly impacted by climate change, or been aware that they have, or because they feel that other issues deserve greater precedent in their decision. <https://climatecommunication.yale.edu/visualizations-data/ycom-us/> (Screenshot by Lena Fortun, July 14, 2021)

2. COMBO DISASTER & OTHER ENVIRONMENTAL THREATS

Climate Change: The Great Multiplier

Lena Fortun

Climate change has recently been made significantly worse through a mix of natural drivers, increased greenhouse gas emissions, and consistent repudiation of both the idea of climate change and any actions that might ease its effects but some government officials. In Imperial County specifically, along with other common drivers, industrial

agriculture has had a notable impact. According to the Center for Ecoliteracy, “The links between industrial agriculture and climate change are twofold. On the one hand, industrially produced food systems are energy-intensive and fossil-fuel based, and thus contribute significantly to climate change. On the other hand, the crops grown in the genetically homogenous monocultures that are typical of chemical farming are not resilient to the climate extremes that are becoming more frequent and more violent”. The agricultural industry in the U.S., and in Imperial County, is fossil-fuel based, a known driver of climate change; the industry directly contributes to climate change “through the fuel burnt by agricultural machinery, during food processing, and by transporting the average ounce of food over a thousand miles”. The Center for Ecoliteracy states that industrial agriculture contributes to about 25 to 30% of global greenhouse gas emissions (Copra 2015). According to 2017 data, there are approximately 400 farms in Imperial County, 34% of which grow livestock, which among other things, produces methane, another known driver of climate change, and uses over 500,000 acres of land (U.S. Department of Agriculture 2017).

The only way to slow climate change and its effects is to change our actions and regulations. Greenhouse gas emissions need to be reduced, companies and factories releasing pollutants need to be regulated, and research needs to be done; when things are not done, climate change is only made worse. Due to Imperial County’s close proximity to the U.S.-Mexico border, many government agencies and companies, including the U.S. Environmental Protection Agency, have tried to place blame on the Mexican government, stating that they cannot regulate the pollutants and emissions coming from across the border. Trump’s EPA has done exactly this and is currently being sued for their actions and putting thousands of Californians at greater risk. According to the Center for Biological Diversity, “numerous emission-reduction opportunities exist in Imperial County that, if implemented, could create livable-wage jobs at the same time as addressing the deadly air-pollution problem” (Center for Biological Diversity 2020).

Climate change is known to increase the probability and frequency of extreme weather events and Imperial County is seeing this firsthand. Like much of California, Imperial County has been faced with historic drought that has only been made worse in recent years (Figure 9). The lack of precipitation has caused the water level of the Salton Sea, an asset in Imperial County, to drop to a record low. Since the Salton Sea is at the lowest sea level in the county, all runoff sources and waterways flow into the Salton Sea; therefore all agricultural runoff, water from the toxic New River, and more flow into the Salton Sea. Studies have shown that reduced precipitation, ground heating, and the diminishing water level in arid climates create a higher “risk of exposing previously sequestered toxic chemicals to open air.” The pollutants and particulates from the sources mentioned settle into the soil below and surrounding the Salton Sea. Consequently, when drought causes dust to be picked up by wind, sometimes creating dust storms in Imperial County, people are not only breathing in dust but also all of the toxic particulates that settled in the soil (Doede, DeGuzman 2020). Drought and water scarcity can also cause a number of other health impacts. The lack of moisture seen during droughts, already at a low level in California, can significantly increase the risk of wildfires. Droughts can also decrease availability and the quality of water, it reduces the amount of water available to fight wildfire, which are at an increased probability, and it may increase exposure to other health hazards, including dust storms, extreme heat events, and flash flooding (Maizlish et al 2017).

WHAT ARE THE CLIMATE PROJECTIONS FOR THE DESERT REGION?

The impact of climate change in California varies across the state due to diversity in biophysical setting, climate, and jurisdictional characteristics. The California Adaptation Planning Guide organized the state into climate impact regions based on county boundaries in combination with projected climate impacts, existing environmental settings, socioeconomic factors, and regional designations and organizations.⁹ Figure 1 is a map of climate impact regions.

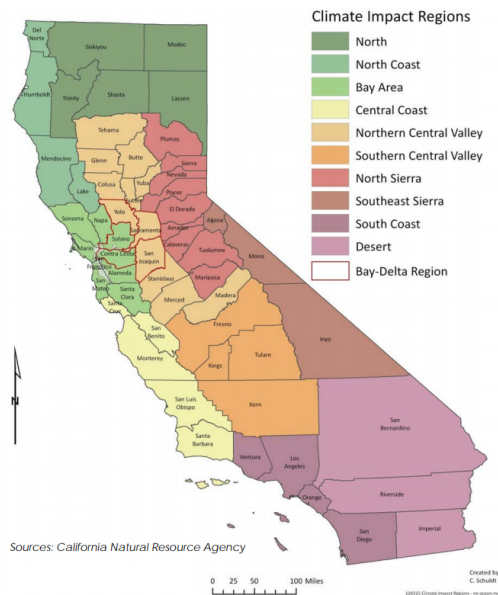


Figure 1. California Climate Impact Regions designated in the *California Climate Adaptation Planning Guide*⁹

4

FIGURE 9: This map shows the designation of different climate impact regions from the California Adaptation Planning Guide, in turn used by California’s Department of Public Health. Imperial County is in the “desert” region, which is reported to have a high likelihood of substantial temperature increase over the next century. With the Covid-19 pandemic, extreme heat is even more of a threat due to cooling centers, public facilities where residents can go cool off, closed due to Covid-19 restrictions.
https://www.cdph.ca.gov/Programs/OHE/CDPH%20Document%20Library/CHPRs/CHPR025Imperial_County2-23-17.pdf (Screenshot by Lena Fortun, July 14, 2021)

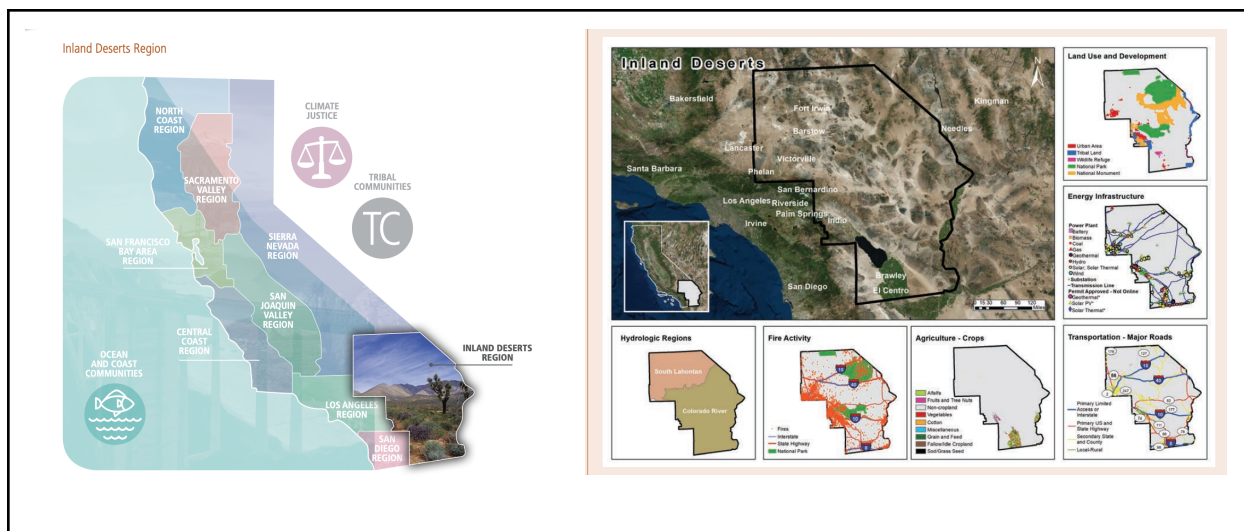


FIGURE 10: These maps show how California regions were divided up for study in California’s Fourth Climate Change Assessment. The Inland Deserts region includes all of Imperial County and the desert portions of Riverside and San Bernardino Counties (Hall 2018).

https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-008_InlandDeserts_ADA.pdf (Screenshot by Lena Fortun, July 14, 2021)

While drought does significantly increase the risk of wildfires, historically, Imperial County has not been at risk due to the desert conditions (Figure 11). If wildfires were to occur in Imperial County, there could be an impact on their watersheds, and increase risk of landslides or mudslides, an increase in sediment in run-off that could reduce water quality, a risk of fire-related injuries, and resultants of fires, like smoke, ash, and fine particulates can increase respiratory risks (Maizlish et al 2017). Luckily, Imperial County is not predicted to be at risk of wildfires in the future, despite climate change. Although if Imperial County were to face wildfires, they would be more at risk due to the stress the COVID-19 pandemic has put on budgets. The state of California has money set aside for additional funding needed for emergency wildfire response, however the question “is whether the state can commit this level of funding amid the pandemic” (Zunich 2020).

Climate change and the greenhouse gases trapping heat from the sun inside the atmosphere also escalate the likelihood of progressive temperature increases and extreme heat events (Figure 13). California’s Fourth Climate Change Assessment for the

Inland Deserts Region, states that climate change has already increased temperatures in the region (Carranza et al 2018). According to the Climate Change and Health Profile Report, in a high-emission scenario, which many people think we are on track for if action is not taken, Imperial County could see a 6.4°F increase by 2099; from their historic average of 73.4°F to a 79.8°F average. Increased temperatures can lead to heat-related illnesses, from mild heat stress to fatal heat stroke, exacerbation of preexisting conditions, intensification of the reactions that produce smog and ground level ozone, making respiratory diseases worse, and enhancing the growth of plants, increasing pollen production associated with allergies (Maizlish et al 2017). With the ongoing COVID-19 pandemic causing many public spaces to no longer be available, extreme heats are even more of a threat since many cooling centers are not opening up this season.

There is also concern for what increased temperatures will do to the agricultural industry. Inside Climate News states that “warmer temperatures would boost pest populations, causing farmers to use more insecticides that, with more frequent and severe storms, turn into toxic runoff”. The more pesticides that farmers use the greater chance of those chemicals getting into local water supplies and into “sensitive aquatic ecosystems”. Not only would an increase in insects cause farmers to use more pesticides, but it would also increase the transmission of diseases that insects carry between crops and cause farmers crops to deplete faster in an already harsher climate (Gross 2021). In Imperial County, these insecticides carried away in agricultural runoff and deposited into the Salton Sea, further polluting the water and increasing the toxicity of the rising dust.

I have found very little to no research or data on Imperial County’s preparedness for the hazards associated with climate change.

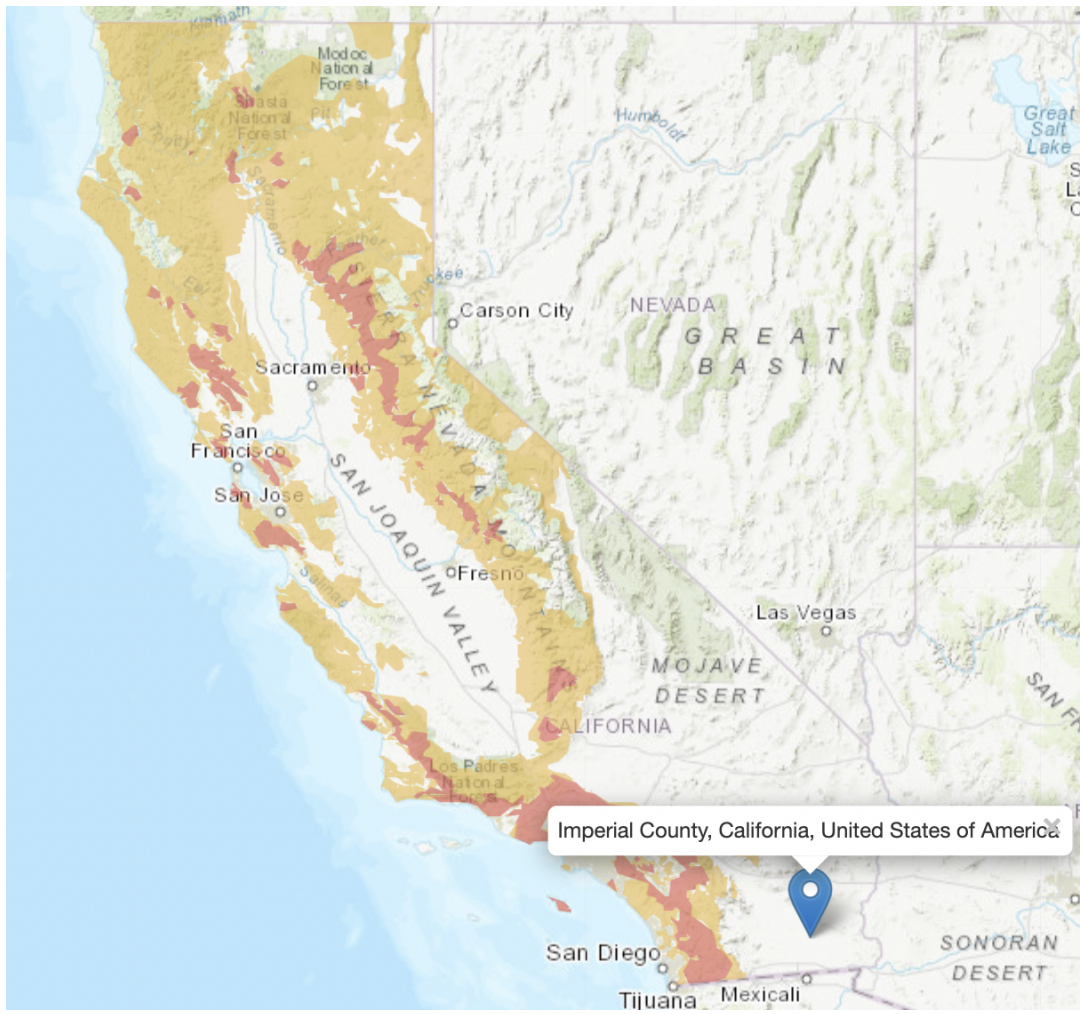


FIGURE 11: Pictured above is the California Public Utilities Commission (CPUC) Fire Threat Map which depicts areas with extreme hazards in red and elevated hazards in yellow. Due to its desert conditions and minimal biomass, Imperial County has very little to no extreme fire threat.

<https://ia.cpuc.ca.gov/firemap/#> (Screenshot by Noelle Chin, July 14,2021)

3. COMPOUND VULNERABILITIES

The Domino Effect

Katherine Wu

Imperial County's community vulnerability is increased by various socioeconomic factors including high poverty rates, lack of accessible health services, and linguistic barriers which exacerbate the effects of environmental crises.

The most determinant factor in increasing environmental health vulnerability is economic status. In 2013, the median family income in Imperial County was 25% below the median national family income and 23.3% of people lived below the federal poverty level. Imperial Valley residents are more "susceptible to poverty-related health risk" (National Institute of Health, 2020) and the lack of economic resources also means that medical support and opportunities to avoid dangerous air pollution are less accessible. In addition, the unemployment rate is 16.3%, an extremely high percentage compared to the 11.8% rate in the whole of California. The lack of employment and economic opportunities in Imperial County keeps generations of residents stuck in the cycle of poverty as well as at high risk of respiratory illnesses. In addition, only 20.7% of residents attain an associate degree or higher which closes the door to economic opportunity and stable employment. A side effect of the poverty afflicting Imperial County is the prevalence of homelessness and food insecurity. The housing crisis has become so dire that the county has allowed for a

temporary encampment to be made on public land, housing farmworkers in subpar and unsanitary conditions. Living in these conditions puts these agricultural workers at much higher risk for health issues and they are especially vulnerable to the effects of pollution from nearby RMP facilities. In addition, access to nutritious foods is a crucial social determinant of health and nearly 35,000 residents of Imperial County are considered food insecure and are more likely to have poor health. The poverty experienced by Imperial County which manifests in a lack of economic and educational resources, high unemployment, food and housing insecurity, and a plethora of other issues puts the community at greater risk in the face of environmental challenges.

Another prominent factor which affects Imperial County's vulnerability are racial and health disparities. The Imperial Valley houses a predominantly Hispanic/Latinx population, many of whom are agricultural workers. These agricultural jobs are typically seasonal and low-paying while also exposing workers to dangerous and toxic particles that pollute the air. Hispanic/Latinx workers and residents are disproportionately affected by health issues and are at higher risk for Covid-19, making up "85% of the population and a startling 95% of deaths" (Koran, 2020). In addition, the Hispanic population faces linguistic barriers which prevent many from receiving necessary medical attention. The systemic racism which affects the majority of Imperial County residents makes them more vulnerable to risks created by air pollution. Imperial County's health services are not only lacking in language services but are short of staff as well; there are only 23.5 medical doctors per 100,000 population compared to California's average of 79.6. In addition, there is an urgent shortage of personal protective equipment (PPE) which has become an essential in facing the Covid-19 pandemic. These health disparities further jeopardize the community and compound the effects of environmental vulnerabilities.

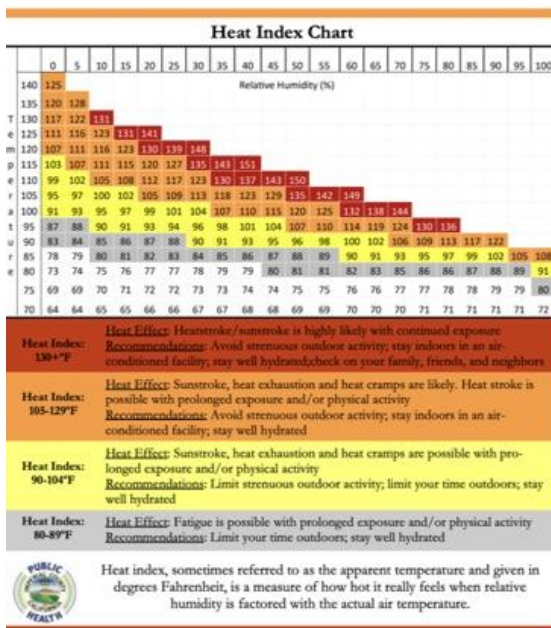
PEOPLE

Income & Poverty

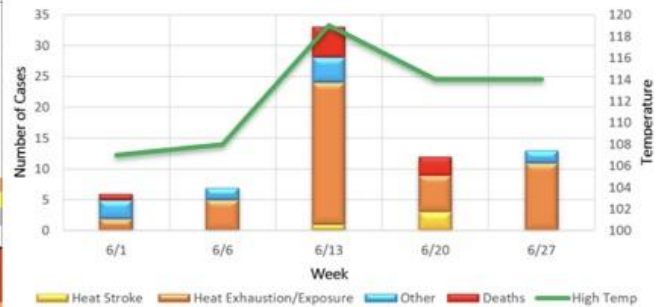
Median household income (in 2019 dollars), 2015-2019	\$47,622
Per capita income in past 12 months (in 2019 dollars), 2015-2019	\$18,018
Persons in poverty, percent	▲ 22.0%

FIGURE 12: This data from the U.S. Census Bureau reflects the high poverty rate of 22.0% in Imperial County, much higher than the 11.8% percentage of people living under the poverty line throughout the whole of California. Residents of Imperial County are more vulnerable due to lower economic status.

<https://www.census.gov/quickfacts/fact/table/imperialcountycalifornia/IPE120219#IPE120219> (Screenshot by Katherine Wu, July 15, 2021)



**HEAT-RELATED ILLNESS SURVEILLANCE 2021
IMPERIAL COUNTY**








Heat-Related Morbidity & Mortality	Total as of July 3, 2021	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Heat Stroke	4	21	25	34	8	15	11	29	27	19	14	26	13
Heat Exhaustion / Exposure	47	98	191	91	55	54	43	68	79	25	40	60	59
Other illnesses (i.e. heat fatigue, dehydration)	11	132	150	110	93	50	34	60	41	23	45	19	27
Deaths	9	5	25	8	3	10	2	3	8	2	8	9	7
Totals	71	256	391	243	159	129	90	160	155	69	107	114	106

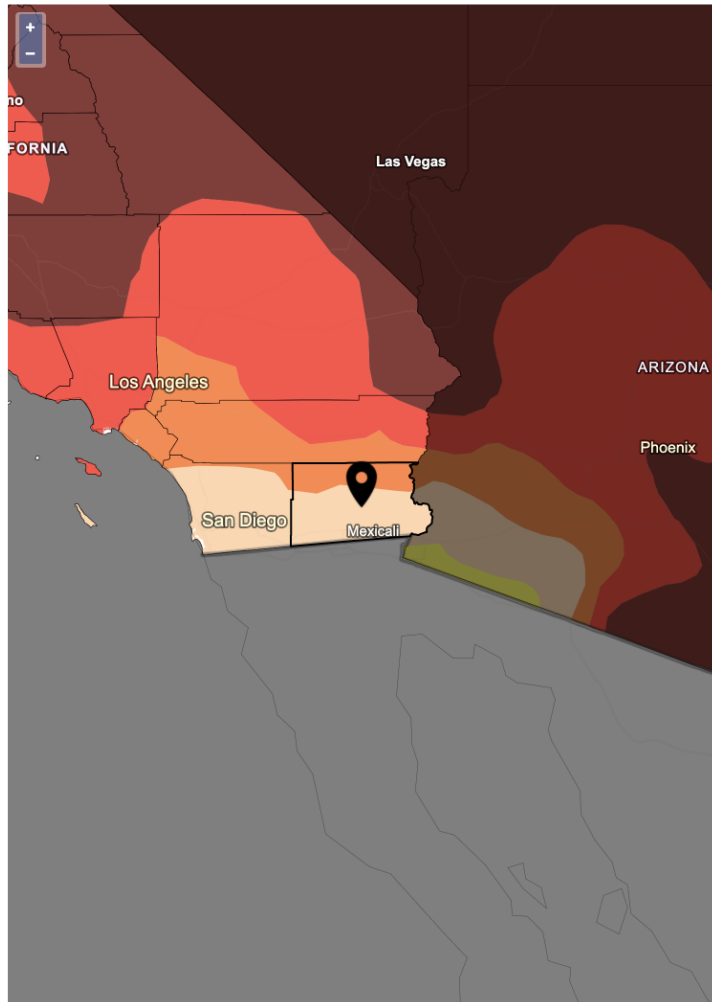
Source: El Centro Regional Medical Center, Pioneers Memorial Hospital, and Imperial County Coroner

FIGURE 13: In the heat report released by Imperial County Public Health, temperatures were up to 117°F, warranting an excessive heat warning. The area has seen an increase in heat-related morbidity and mortality with a low of 69 cases in 2011 and a high of 391 cases in 2018. The heat index experienced by Imperial County makes sunstroke, heat exhaustion and heat cramps likely to occur and there is a possibility for heat stroke. These conditions are likely to affect residents, especially due to the agriculture industry and large farmworker population, who are at high risk of getting heat stroke. The heat risk is extremely detrimental to Imperial County where medical care is insufficient.

https://www.icphd.org/media/managed/medicalproviderupdates/Heat_Report_070321.pdf (Screenshot by Katherine Wu, July 15, 2021)

The U.S. Drought Monitor (USDM) is updated each Thursday to show the location and intensity of drought across the country using a five-category system, from Abnormally Dry (D0) conditions to Exceptional Drought (D4). The USDM is a joint effort of the National Drought Mitigation Center, USDA, and NOAA. [Learn more.](#)

 <p>D0 - Abnormally Dry</p> <ul style="list-style-type: none"> • Soil is dry; irrigation delivery begins early • Dryland crop germination is stunted • Active fire season begins 	100.00% of Imperial County (D0-D4)
 <p>D1 - Moderate Drought</p> <ul style="list-style-type: none"> • Dryland pasture growth is stunted; producers give supplemental feed to cattle • Landscaping and gardens need irrigation earlier; wildlife patterns begin to change • Stock ponds and creeks are lower than usual 	100.00% of Imperial County (D1-D4)
 <p>D2 - Severe Drought</p> <ul style="list-style-type: none"> • Grazing land is inadequate • Fire season is longer, with high burn intensity, dry fuels, and large fire spatial extent • Trees are stressed; plants increase reproductive mechanisms; wildlife diseases increase 	32.12% of Imperial County (D2-D4)
 <p>D3 - Extreme Drought</p> <ul style="list-style-type: none"> • Livestock need expensive supplemental feed; cattle and horses are sold; little pasture remains; fruit trees bud early; producers begin irrigating in the winter • Fire season lasts year-round; fires occur in typically wet parts of state; burn bans are implemented • Water is inadequate for agriculture, wildlife, and urban needs; reservoirs are extremely low; hydropower is restricted 	0.00% of Imperial County (D3-D4)
 <p>D4 - Exceptional Drought</p> <ul style="list-style-type: none"> • Fields are left fallow; orchards are removed; vegetable yields are low; honey harvest is small • Fire season is very costly; number of fires and area burned are extensive • Fish rescue and relocation begins; pine beetle infestation occurs; forest mortality is high; wetlands dry up; survival of native plants and animals is low; fewer wildflowers bloom; wildlife death is widespread; algae blooms appear 	0.00% of Imperial County (D4)



Source(s): U.S. Drought Monitor, UC Merced

Updated weekly - 07/13/21

FIGURE 14: This map, created with data from the U.S. Drought Monitor (USDM), reflects the water scarcity in Imperial County. 100.00% of Imperial County is afflicted with moderate drought, meaning that pasture growth is stunted which can lead to use of pesticides and supplemental feed, landscaping need earlier irrigation, and local bodies of water are drier than usual. In addition, 32.12% of Imperial County experiences severe drought where grazing land is unusable and there is a higher risk of severe fire seasons. <https://www.drought.gov/states/california/county/imperial> (Screenshot by Katherine Wu, July 15, 2021)

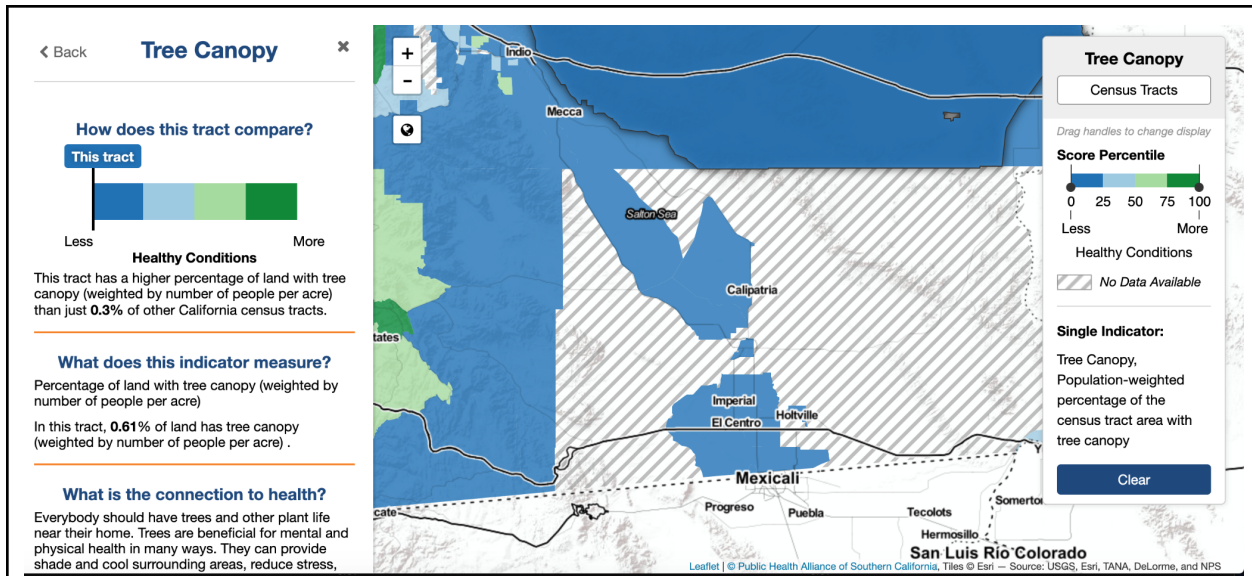


FIGURE 15: In maps provided by the California Healthy Places Index, Imperial County is shown to have very little tree canopy, with all of the counties that have data available being in the lowest percentile for census tracts in California, with just 0.61% of land having tree canopy. Trees have many health benefits, including cooling, which is especially important during extreme heat effects associated with climate change, which are expected to increase in Imperial County in the coming years (Ulmera et al 2016) <https://map.healthyplacesindex.org/> (Screenshot by Lena Fortun, July 14, 2021)

Figure 7. Profile of Health Outcomes and Inequities, Social Vulnerabilities and Climate Risks, Imperial County

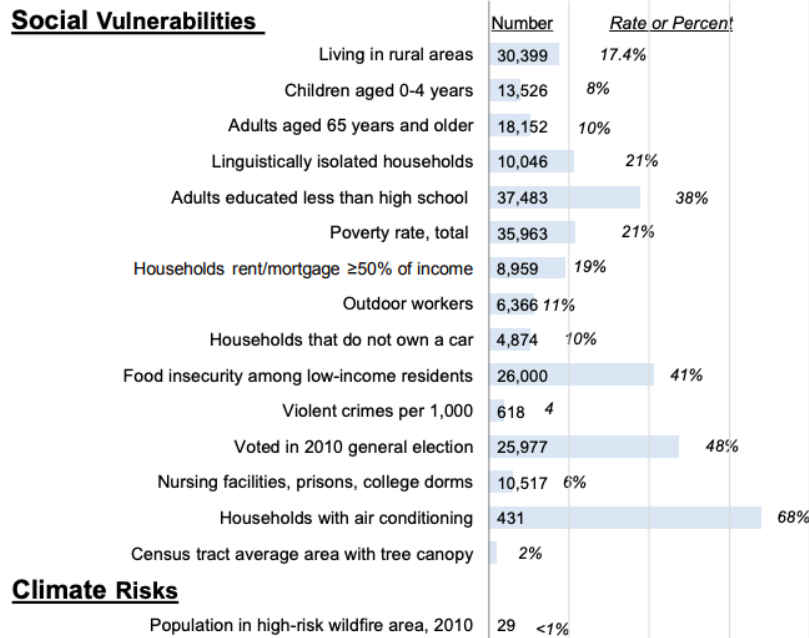


FIGURE 16: A 2017 report by the California Department of Public Health says that in Imperial County, the total poverty rate is 21% (35,963 people), and 41% of low-income residents have food insecurity, pointing to the need for investments in both government aid and data collection to track access to reliable sources of food. California Department of Public Health. 2017. Imperial County Climate Change and Health Profile Report. State of California. (Screenshot by Diana Kou, July 14, 2021)

4. STAKEHOLDER ANALYSIS

“Don’t Blame it on Me!”

Clara Carrabba

Climate change is taking a devastating toll on Imperial County’s low-income residents, who receive little assistance from state and local governmental bodies. The biggest advocates for these residents are environmental organizations that have observed the anthropogenic causes of global warming in the region. Comite Civico del Valle, a local nonprofit, works with the community to improve the livelihoods of the county’s disenfranchised habitants. With a 15.1 percent asthma prevalence, over double the state average, air pollution is one of the most significant hardships for those living in Imperial County (Aguilera 2019). To record and combat this issue, the CCV installed 40 air quality monitors throughout the valley. This group is one of few that has taken account of and devoted resources to prevention of environmental hazards in Imperial County. Other groups, such as Earthjustice and the Sierra Club, have fought for Imperial County in the past, but have since remained relatively silent on advocacy for the deeply impoverished community against its hazardous conditions. In 2001, Earthjustice sued the EPA on behalf of the Sierra Club multiple times for waiving clean air requirements in the valley (Carrier 2001). Their efforts were to no avail, as air quality still remains of the lowest in the state and little is being done to improve it.

Because the county sits on the border, state and local governments have a simple reasoning for the jarring amounts of particulate matter that residents breathe in daily: Mexican emissions cannot be regulated. However, according to a 1997 EPA study, Imperial Valley emissions alone would violate Clean Air Act requirements (Carrier 2001). Therefore, governmental bodies' stagnancy has no sufficient explanation, save for the millions of dollars brought in by the county's ~400 farms (US Department of Agriculture 2017). Industrial agriculture is the main polluting industry of Imperial County that is simultaneously its main employer and income provider. Agricultural pollution exacerbates climate change, increasing the frequency of extreme weather events and showing immediate health effects on farmworkers.

Along with the lack of environmental regulations for the intense agricultural industry, moderate to severe drought has plagued the county for years, and it is only getting worse (Figure 9). Increasing temperatures in the already hot, arid climate of the southernmost California region will make earning a liveable wage impossible for financially struggling farmworkers, who make up a large portion of the community. As temperatures are predicted to increase 2-4 degrees by 2050 and 5-8 degrees by 2100, sustaining crops will grow increasingly difficult, and raising livestock will become more expensive and resource-depleting (Climate Change and Health Profile Report Imperial County). Not only hotter temperatures, but even less annual rainfall is predicted and extreme weather events, such as heatwaves, will become more frequent (Climate Change and Health Profile Report Imperial County). In coming years, farmworkers' labor will become more intensive, dangerous, and even fatal in some cases, and their already low socioeconomic status will tank even further. If governments, environmental groups, and local residents do not band together to obtain environmental justice for Imperial County quickly, many livelihoods will be lost and the county will plummet even further into distress and deadly climate conditions.

5. STAKEHOLDER ACTIONS

Who Has Been Helping?

Clara Carrabba, Yvonne Wen

The current inevitability of irreversible damage to the Earth is due to a combination of factors, including human activity, natural causes, and lack of response. Impoverished communities like Imperial County will bear the brunt of extreme weather conditions and climate-induced hardships.

Imperial County, a majority-Latinx, agriculture-intensive community of California, already faces intense heat and drought. While California is seen as a state on the frontlines of the fight against climate disaster, many incidents in Imperial County have been breezed over if not wholly ignored.

Governor Gavin Newsom has stated his concern regarding climate and has proposed sustainable laws. In January, Newsom introduced a \$4.1 billion proposal “meant to fight climate change, grid California against devastating wildfires, reduce smog, and bolster the adoption of clean vehicles on the state’s roads” (Stark et al. 2021). This goes along with his promise to end the sale of new gas-powered cars by 2035, in a push for electric vehicle usage. As transportation pollution because of highways and the transport needed for crops and agricultural supplies plagues Imperial County, these new measures will provide some relief from air pollution for residents. In addition to this, government agencies did

agree that the Salton Sea crisis be declared an urgent matter, and Newsom's 2020-21 budget added \$220 million to the Salton Sea Management Program (Kirby 2020). While this is a huge step in the right direction, there is still a reluctance to take accountability for hazardous environmental conditions in the area. Newsom's response claimed that there are "other factors responsible for the current air quality concerns," which include Mexican emissions, agricultural burning, PM 2.5 levels, and transportation pollution, all of which are supposedly being "addressed by the state" (Kirby 2020). Most of these problems have not been addressed since regulations, and Imperial County climate conditions have not improved. Residents are still struggling with adverse health effects, like asthma and respiratory problems, and extreme weather, including severe drought and temperatures.

The pandemic does not help with the environmental injustices that have occurred in Imperial County. Imperial County, which is 85% Hispanic, has consistently had one of the highest death rates in the United States, let alone the rates of people living in poverty, children who qualify for free or reduced lunch, low-income food insecurity, people 65 and older in fair or poor health and people diagnosed with diabetes are higher than the average of the U.S. (Jervis, Plevin, Hughes, Ornelas 2020).

Nurses and doctors at El Centro Regional Medical Center, about 20 miles from the U.S.-Mexico border, raced from patient to patient (Jervis, Plevin, Hughes, Ornelas 2020). The nurses really got attached to these patients (Jervis, Plevin, Hughes, Ornelas 2020). To help Imperial County with getting away from the attack of the combinations of the deadly virus and existing injustices, the ACLU of San Diego and Imperial counties has pushed county supervisors to collect and publish additional information on those who have been infected – data on gender, primary language, health insurance coverage and whether they are "essential workers" – with the hopes of gathering knowledge that can help the county fight back (Koran 2020).

6. ROLE OF MEDIA AND BIG ENVIRONMENTAL ORGANIZATIONS

Plenty of Room for Improvement for More Coverage and Intervention

June Su

Imperial County's environmental issues have somewhat caught the attention of large-scale media and environmental organizations through coverage of fast disasters and instances of extreme pollution. However, most other combo disaster and slow disaster threats that more slowly degrade the environment are largely ignored.

The Los Angeles Times, a prominent newspaper with a focus on the Southern California area, has covered Imperial County's environmental problems a handful of times in the past few years. Out of these articles, many concentrate on water pollution in the Salton Sea. In 2019, the Times Editorial Board wrote an editorial discussing the neglect of the Salton Sea

by governmental organizations and how their mitigation projects have largely failed. “None of the promised projects have been completed” and the body of water can become “a health and ecological catastrophe” if inaction continues (Times Editorial Board 2019). In both 2017 and 2021, articles about earthquakes in the county were released, demonstrating their emphasis on fast disasters. Occasionally, other stray environmental articles about Imperial county are released but the news organization’s coverage of Imperial County has been mostly about COVID-19. As a result, environmental news is hard to come across. Although statewide coverage on Imperial County’s wide range of environmental hazards is sparse, local news organizations like the Imperial Valley Press are sure to update their readers more fully with headlines focusing on diverse environmental topics much more frequently.

Nonprofit environmental organizations on the other hand have been involved in Imperial Valley fairly frequently. The Sierra Club, a nationwide operation, has made numerous actions in the county. For instance, the nonprofit “pushed to put health concerns on the agenda in hearings about mitigating the impact of the water transfers” regarding the redirection of water from the Salton Sea (Bacon 2017). The organization has also been involved in a lawsuit against the Environmental Protection Agency for their lack of air pollution regulation in the county due to their proximity to the border (9th Circuit 2003). Greenpeace, an international environmental organization, has also been directly involved in the county. They took their “campaign for renewable energy directly to Sempra Energy” to protest the corporation’s plans to build a power plant that would directly affect the county (Lindquist 2002) However, no new measures have been taken by large scale agencies and tackling broader environmental issues in Imperial County, like stark health disparity, is nowhere to be found on their agendas or their history. While much more attention could still be paid to Imperial county from large-scale nonprofits, their direct action in some cases demonstrates some reasonable involvement.

The county’s Wikipedia page is almost completely lacking in information on

environmental threats the area faces. The Salton Sea and the agricultural runoff it receives are mentioned briefly, but that is the farthest the page goes to discuss environmental hazards in the county. The talk page is the same and does not bring up environmental hazards once. Considering how greatly it affects the area, the lack of information is telling of how much Imperial county pollution is covered in general.

7. RECOMMENDED LOCAL ACTIONS

Getting to Work!

Khira Pearlstein

Imperial County is home to many environmental hazards contributing to climate change, which means that it is in great need of actions from its community members in order to begin resolving some of these issues. Agriculture is the main source fueling Imperial County's economy, they rely on their agricultural industry for a majority of jobs, food, and more. With the extensive farming practices come an increase in methane and pesticide pollution. Obviously limiting the agriculture industry is not an option, so it is important for the community to get involved and make change. Some ideas of local actions to combat this pollution are to spread awareness of the dangers of pesticides and encourage farmers to use less toxic alternatives through educational seminars or even financial incentives. In regard to methane pollution, recommend that people consume less red meat or try to regulate the amounts of waste farms can emit.

Along with just about every other county in California, Imperial is certainly not innocent when it comes to fossil fuel and CO2 emissions, primarily from vehicles. With this issue being nationwide, it is necessary that people of Imperial County take matters into their own hands. By increasing the use of public transportation or implementing a county-funded program where farmers can borrow greener farm equipment at a low cost, Imperial could significantly lower their fossil fuel emissions. They could also take note

from the work of other counties, one being Los Angeles, who has partnered with UCLA to create LA's first sustainability plant, a plan that hopes to phase out the use of all fossil fuels by building new playgrounds and schools at least 500ft. Away from freeways to avoid asthma-causing pollution and retraining workers for new jobs in clean energy and other fields (UCLA Institute of the Environment and Sustainability).

Another major concern is the increased health risk from the environmental impacts of climate change. No matter what actions are taken, the effects of climate change are inevitable and require planning ahead to protect the community. Efforts should include: workplace health initiatives with routine health screenings connecting workers to primary care physicians, increasing access to quality healthcare through local clinics, and educating parents and school nurses on how to identify and treat children affected by air pollution.

One of the most urgent issues needing to be addressed in Imperial is water pollution. As a county, Imperial relies on very few bodies of water, including the Colorado River, to irrigate their farms and use as their main source of drinking water. Unfortunately due to agricultural runoff, waste produced from meat packing facilities, etc. the water in Imperial County has become extremely contaminated and unsafe for daily use. Local actions that could improve the water quality are insisting on regulation and reduction of farm runoff as well as regular water testing. Imperial could look towards San Joaquin Valley for inspiration. They have set out to improve their water quality by working to keep nitrate out of the soil and groundwater. "The idea is for farmers to track applications of fertilizer, which contains nitrate, and yields of crops, which consume nitrate as they grow" (Meadows 2017).

The number one priority for citizens of Imperial County is to address the horrendous air quality which is causing more and more health hazards every day. Imperial has already put an air monitoring system in place, by working with local environmental activist group Comite Civico del Valle, that can help people know whether or not it is safe to be outside

breathing the air. While this initiative was successful, the community should work to increase the use of air monitoring and the spread of data. They could also spread awareness through social media campaigns, posters, workplace bulletins and seminars. Another action could be to coordinate land development to create sustainable and affordable

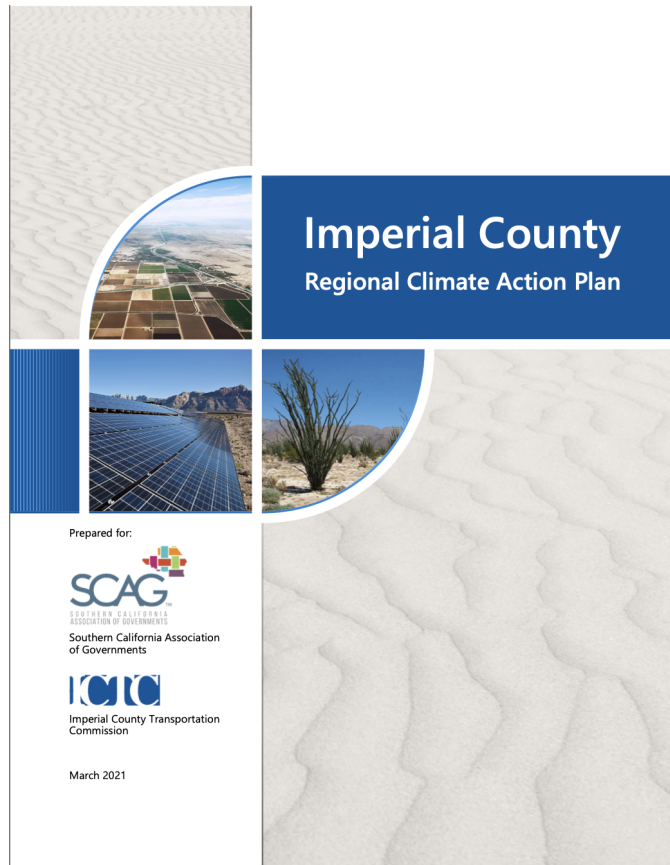


FIGURE 17: In March of 2021, the Imperial County Transportation Commission (ICTC) drafted the Regional Climate Action Plan for Imperial Valley as an effort to reduce greenhouse gases within the county. Their main goal is to help California reach the state legislature mandated greenhouse gas emission levels by doing their part in Imperial County (Southern California Association of Governments, 2021).

http://www.imperialctc.org/media/managed/pdf/ICTC_Draft_Regional_Climate_Action_Plan1.pdf

(Screenshot by Khira Pearlstein, July 15, 2021).

Climate “artivism” is a way of inspiring climate action through various forms of art whether it be visual, theatre, literature, or more. For Imperial County we have developed a project called “Imperial Talks!” The structure of this project would be monthly or bi-monthly meetings, similar to open mic nights, where anyone can choose to share poetry, speeches, or any form of art that they have created around climate change. Besides the “open mic nights,” members could work together to create collaborative art pieces demonstrating how climate change/environmental disasters have impacted the community. Ideally this organization would be quite casual and mainly student run, so kids and teens feel they have a safe space to learn and share. To spread the word, we could display imperial talks through a community painted mural, an easy access website, and local media coverage. To encourage attendance, we would utilize that previously mentioned website to post short clips of what an Imperial Talks meeting looks like , offer community service hours for participation, or hold art contests with prizes for various age levels. Ultimately the goals would be to inspire community members to think about and practice climate activism and demonstrate the emotional impacts of climate change on a community. To evaluate the successfulness of the project we would record the number of meeting attendees and individual site visits. We would also post a survey where people could give anonymous feedback and comments.

IMPERIAL TALKS!



WE HOPE TO INSPIRE COMMUNITY MEMBERS TO THINK ABOUT AND DEMONSTRATE THE EMOTIONAL IMPACT OF CLIMATE CHANGE AND CREATE AN INCLUSIVE COMMUNITY READY TO DISCUSS AND PRACTICE CLIMATE ACTIVISM



MONTHLY OPEN MIC NIGHTS WHERE ANYBODY CAN GET UP AND SHARE POEMS/SPEECHES AND/OR DISPLAY ANY ART OR PROJECTS CENTERED AROUND CLIMATE CHANGE AND ITS EFFECTS



VIEW OUR WEBSITE TO SIGN PETITIONS REGARDING CLIMATE CHANGE AND GIVE FEEDBACK FOLLOW US ON SOCIAL MEDIA TO GET UPDATES ON ACTIVITIES AND LOCAL STORIES

FIGURE 18: Climate Artivism Poster for Imperial County (Poster by Lena Fortun, July 15, 2021).

8. RECOMMENDED EXTRA-LOCAL ACTIONS

With Great Power Comes Great Responsibility

Diana Kou

For extra-local actions, the target is to set an adequate goal to meet the necessary environmental standards in order to reduce carbon emissions.

The Green New Deal, which has been reintroduced in 2021 by Representative Ocasio-Cortez and Senator Markey, is the most progressive plan with the goal to mitigate climate change. The resolution reaffirms the massive threats produced by climate change as well as the responsibility of the US government to recommit to meeting emission goals outlined by the Intergovernmental Panel on Climate Change. Its contents also include environmental justice measures, and includes education, job training, and financial support for affected American workers if the US commits to switching from fossil fuels to renewable resources.

Although President Biden has rejoined the Paris agreement, the Biden Plan For A Clean Energy Revolution And Environmental Justice is not aggressive enough considering the deadly and costly damages that will result from delaying effective measures against climate change. The Green New Deal would greatly benefit Americans now, future

generations of Americans, and the world.

Air pollution and the consumption and dependence on fossil fuels have had severe effects on the health and quality of life of Imperial County residents. It is within Biden's power to declare a national security emergency: climate change (Roberts 2020). This would enable him to implement industrial policy directly, such as boosting electric vehicle production and charging infrastructure, long-distance electricity transmission lines, solar panels, and more to address climate change throughout the US. For Imperial County residents, a switch to sustainable energy would heavily reduce air pollution, despite possible opposition from oil companies and those with financial connection to oil companies.

The State of California can also take steps towards effective environmental governance in response to climate change hazards. One solution to excessive passenger vehicles is reducing commuting times by solving the housing crisis and building out proper public transportation systems, which will need to be electrified (Roberts 2017). As a result, there would be less ground level ozone, and rural counties like Imperial County would be able to provide better public transportation for workers who have long daily commutes. An increase in gas prices would also deter people from using their own personal transportation and encourage the use of public transportation. If there is affordable, effective means of public transportation, the public may not be opposed to the increase.

The State of California can also invest more in preventative and remedial measures. Investing more into power grids is a preventative measure because the current system needs reform in order to handle the oncoming increase of climate-related disruptions and an ever-growing population. The current electric grid is old and needs an upgrade. Smarter, renewable infrastructure that will last many more years into the future is needed. In the event of an emergency, creating effective earthquake evacuation plans would prove to be an incredible remedial measure. Earthquakes put all of California at risk, but once the big one hits, an effective evacuation plan could save innumerable lives.

A preventative measure against earthquakes is to ban fracking, since fracking can trigger earthquakes when faults within the rock slip.

All signs point to oil being the main cause behind massive environmental hazards: air and water pollution, earthquakes, and global warming. As the window to change our ways before irreversible damage to Earth's climate closes, the time to act is now.

9. RECOMMENDATIONS FOR FUTURE RESEARCH

The Children and Our Future

Diana Kou

In Imperial County, several types of quantitative research would enable community members, policy makers, and future generations to better understand pollution, health impacts, and social variables. Pollution research could be done on the Salton Sea, specifically salinity levels, air quality impact, and health consequences. At animal processing facilities, methane levels, as well as information on feed and waste levels, are also missing. Health research, such as the number of days missed or sent home from school and lung capacity tests, could help complete the picture of the health of the children. Climate change, a daunting subject to many informed people, can lead to pessimism about life, especially for younger generations who may feel their futures are at risk before they can even experience them. Social survey data is needed in order to evaluate the percentage of access to mental health care in students and young adults.

A qualitative study would also help characterize and address environmental hazards. Our proposed study asks the research question: How do people in Imperial County interact with climate change in their everyday lives, both in direct impacts and conversation?

Our target social groups are students, young people, and health professionals like school or hospital nurses. These participants would also be long-term residents of Imperial County. In order to gain access to students and young people, we'd reach out to them through social media, and possibly obtain additional consent from their parents. El Centro Regional Medical Center was hard hit by the COVID-19 pandemic, and the nurses there will probably have lots of experience with respiratory patients. Dr. Adolphe Edward is their CEO, so with his permission and volunteers, we could select nurses to interview. Their identities would remain anonymous, identifying factors would be suppressed, and participation would be anonymous from all other parties, including their hospital or CEO, so that they may be comfortable to say what they'd like.

Participant observation would include following students and nurses around, watching what types of materials they use or encounter in their everyday life and seeing what precautions they take around different materials. Asking participants to recall everything they come in contact with is unreliable because most people wouldn't be able to give an accurate depiction. Observing them in their daily routines would allow us to see what they truly come in close contact with.

For in-depth interviewing, we developed this protocol to interview school or hospital nurses to see what they've noticed among patients with symptoms that are a result of air pollution.

1. What kind of symptoms do these patients have?
 - a. Bloody noses?
 - b. Problems breathing?
2. How many patients come in every week with these problems?
 - a. Is this a normal rate?
 - b. Does it get worse during any time of year?
 - c. Has it gotten worse over time?
 - d. What does this indicate, in relation to environmental problems?

- e. How serious are these problems from a medical perspective?
- 3. Have these students gotten adequate healthcare as a result?
- 4. How has the school board addressed these issues?

Patients with these issues could then be interviewed to see if they understand the seriousness of their health problems and the causes behind them. The results from these interviews would shed some light on the perspectives of students in Imperial County as well as the medical professionals who treat them.

Finally, focus groups would help answer questions about Imperial County's residents and their interactions with climate change, especially in conversations. A group of highschool students who are friends could be interviewed together in order to see their differing or similar perspectives on climate change, as well as climate change's effects on their community, state, country, and world.

We hope that this research would be useful to Imperial county residents, specifically students or parents who might not know their kids could be at risk, policy makers like California budget makers, as well as future generations.

10. INJUSTICE ANALYSIS

Accumulated Pressures and COVID Outbreaks

Noelle Chin

Before Imperial County became the highest COVID-19 mortality rate in California, residents of the area were already facing numerous challenges with economic, health, and infrastructural injustices. Examples of these injustices are evident in the large concentration of industrial developments near low-income and predominantly Latino communities, inadequate performance of state and local government in enforcing clean air regulations and funding public health departments, as well as the lack of data regarding sources of pollution and their impacts on the community. The COVID-19 pandemic and its associated impacts amplified issues that had been plaguing Imperial County for decades and has revealed the dire need of equitable governance in the region.

Prior to the pandemic, Imperial County was one of California's most productive agricultural centers with a large proportion of residents having occupations in farms, meat processing plants, and food transport. As the backbone of the U.S. food supply chain, farmworkers engage in labor intensive work and are exposed to pesticides, contaminated water, and high heat, all the while being paid less than minimum wage (Jervis 2020). Despite their contribution to the state economy, over 20% of Imperial County residents live in poverty and the median household income of the region is less than \$50,000 (Solis 2020). When the pandemic hit the US, the economy took a massive blow as consumer activities slowed due to state lockdowns. Imperial County's farm-based economy incurred huge losses due to the lack of consumer demand and so many farms decided it

was more cost effective to discontinue production, lay off farmworkers, and leave their crops to rot in the fields (National Center for Farmworker Health). The sudden shift in the economy had a devastating effect on Imperial County's vulnerable communities. Laid off workers that already struggled to afford food could no longer pay their rent. According to CalMatters reports, an unknown number of renters were evicted during the pandemic due to the Imperial County Superior Court's decision to ignore the state's eviction moratorium (Levin 2020). To prevent such situations, the reduced number of agricultural workers that did keep their jobs would choose to not report their COVID-19 symptoms to keep working and maintain their incomes. In addition to lack of disclosure, the crowded and unsanitary working conditions on the farms further contributed to the spread of the virus. This situation could be classified as an example of epistemic injustices in Imperial County. An article in the San Diego Union-Tribune pointed out that farmworkers have dealt with the risks of pesticide exposure and heat stroke for years with little issue and thus do not take the threat of COVID-19 seriously (Solis 2020).

Public health departments and hospitals were severely underfunded and ill-prepared to manage the large waves of COVID patients that overwhelmed the county's few medical facilities (CalMatters 2020). Primary care physicians in Imperial County are responsible for almost four times the number of patients compared to the state's average and prior to the pandemic, the public health department had only 6 staff members overseeing the entire county (County Health Rankings 2019)(CalMatters 2020).

In a report from the Robert Wood Johnson Foundation, Imperial County was ranked as having the worst public health factors in California with high rates of illnesses like asthma, diabetes, and obesity that all increase the risk of infection and death by COVID-19 (County Health Rankings 2019). The poor health of the region is due to the multiple sources of air and water pollution associated with agriculture such as industrial manufacturing of fertilizer, agricultural burnings, pesticide use, waste and emissions from concentrated animal feeding operations (CAFO), exhaust from food transport vehicles,

and the toxic dust produced from years of agricultural run-off accumulation being aerosolized by the evaporation of the Salton Sea. While Imperial County is receiving funding for COVID-19 interventions, government efforts should also focus on addressing the various injustices which created the conditions that made residents vulnerable in the first place.

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FIGURES

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