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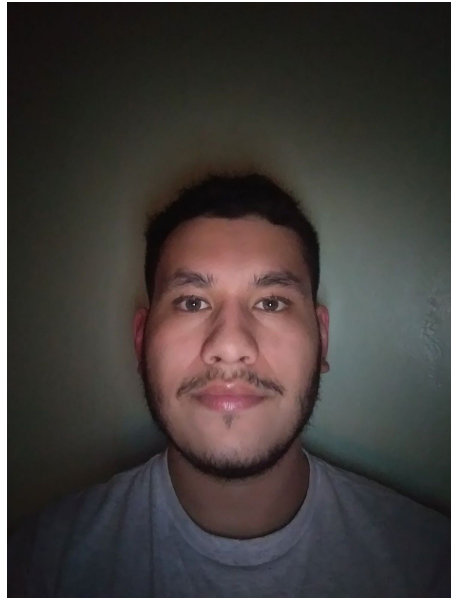
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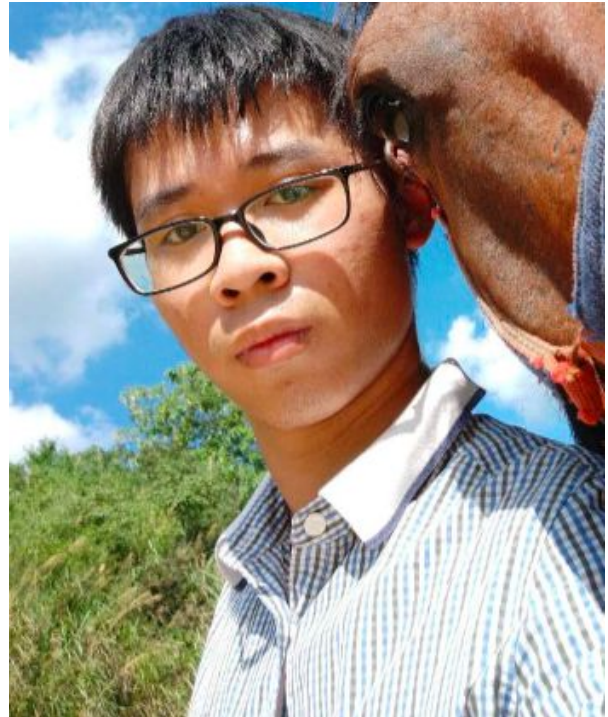
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## TABLE OF CONTENTS

<b>INTRODUCTION</b>	<b>10</b>
<b>SECTION 1: County Setting &amp; Assets [Depei Xu]</b>	<b>12</b>
<b>SECTION 2: Climate Change as Combo Disaster [April Godinez and Tahis Alcantar]</b>	<b>17</b>
<b>SECTION 3: Compound Vulnerabilities [Timothy Do]</b>	<b>27</b>
<b>SECTION 4: Stakeholder Analysis [Huiqi Mai]</b>	<b>31</b>
<b>SECTION 5: Stakeholder Actions [Wonhee Lee]</b>	<b>34</b>
<b>SECTION 6: Role of Media and Big Environmental Organizations [Vince Marin]</b>	<b>37</b>
<b>SECTION 7: Recommended Local Actions [Daniel Jilani]</b>	<b>40</b>
<b>SECTION 8: Recommended Extra-Local Actions [Andrew Ramirez]</b>	<b>44</b>
<b>SECTION 9: Recommendations for Future Research [Haoyang Liu]</b>	<b>47</b>
<b>SECTION 10: Injustice Analysis [Jiaqi Wu]</b>	<b>50</b>
<b>BIBLIOGRAPHY</b>	<b>54</b>
<b>FIGURES</b>	<b>62</b>
<b>APPENDIX</b>	<b>63</b>
Appendix 1: SKETCH: County Assets	63
Appendix 2: SKETCH: Environmental Hazards	65
Appendix 3: SKETCH: Compound Vulnerabilities	67
Appendix 4: SKETCH: Stakeholder Analysis	69
Appendix 5: SKETCH: Stakeholder Actions	72
Appendix 6: SKETCH: Media & Enviro Org Coverage	75
Appendix 7: SKETCH: Possible Local Actions	81
Appendix 8: SKETCH Possible Extra-Local Actions	83
Appendix 9: SKETCH: Data & Qualitative Research Design Proposal	86





**Figure 1.** Location Map of San Bernardino County, CA. (Screenshot by Timothy Do. Wikipedia, retrieved 7/15/2020).

## INTRODUCTION

This case study report focuses on climate change in the San Bernardino 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

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?

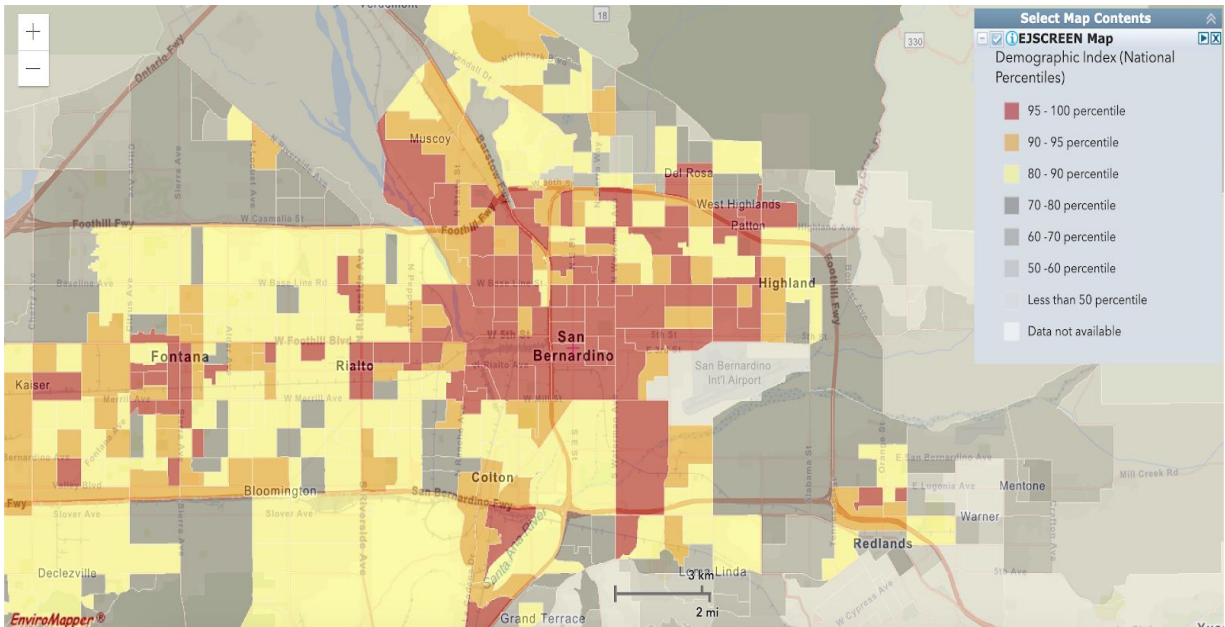
**Figure 2.** This is the analytic framework that guided research for this case study.

## **SECTION 1: County Setting & Assets [Depei Xu]**

San Bernardino County is located in the inland empire of southern California and is the largest contiguous county in the United States, with an area of 52,070 square kilometers. While located in the greater Los Angeles region, San Bernardino County is included in the Riverside-San Bernardino-Ontario metropolitan statistical area; as well as the Los Angeles-Long Beach combined statistical area. According to Native-Land.ca, San Bernardino County is located on the historical land of the Tongva and Yuhaviatam/Maarenga'yam tribes. Due to the complex terrain of San Bernardino County, there are a large number of mountains and deserts.

San Bernardino County has a population of 2,180,085. The approximate population density is around 41.87 people per square kilometer, which is lower than that of California. The majority of the population is Latino (see Fig. 3), accounting for 54.4% of the total population, followed by non-Hispanic Americans, accounting for 27.3%, blacks 9.4%, and Asians. 8%, American Indians are 2.1%. In the county, 21% of the population is foreign-born, and about 79.5% of adults over the age of 25 have at least a high school diploma. The median household income is \$60,164, lower than the state average of \$71,805 (City-Data, n.d.) About 14.9% of the people in this county are in poverty ("US Census Bureau QuickFacts: United States," n.d., see Fig. 3). This has caused San Bernardino County to be in the center of environmental pollution again. California State Attorney General Jerry Brown indicted the County of San Bernardino for failing to account for the impact of global warming in the county's 25-year growth plan under the state's environmental quality act. With the Center for Biological Diversity, the Sierra Club and the

Audubon Society following on separate cases. The case was solved later in the year 2007 with a resolution from the county agreeing to amend its general plan to include Greenhouse Gas Emissions Reduction Plan with emissions inventory and reduction targets. (Office of the Attorney General 2007, see Fig. 4).



**Figure 3.** Demographic percentile combination of low income and minority population in various census tracts of San Bernardino County. The median household income for San Bernardino County is about \$60000 and 14.9% of the population is classified as in poverty (income below 200% of the federal poverty level). (Screenshot by Depei Xu, July 16 2020. From *EPA EJSCREEN Report*, retrieved July 16, 2020.)

San Bernardino County  
Regional Greenhouse Gas Reduction Plan

Final | March 2014



Adelanto	Needles
Big Bear Lake	Ontario
Chino	Rancho Cucamonga
Chino Hills	Redlands
Colton	Rialto
Fontana	San Bernardino
Grand Terrace	Twentynine Palms
Hesperia	Victorville
Highland	Yucaipa
Loma Linda	Yuca Valley
Montclair	

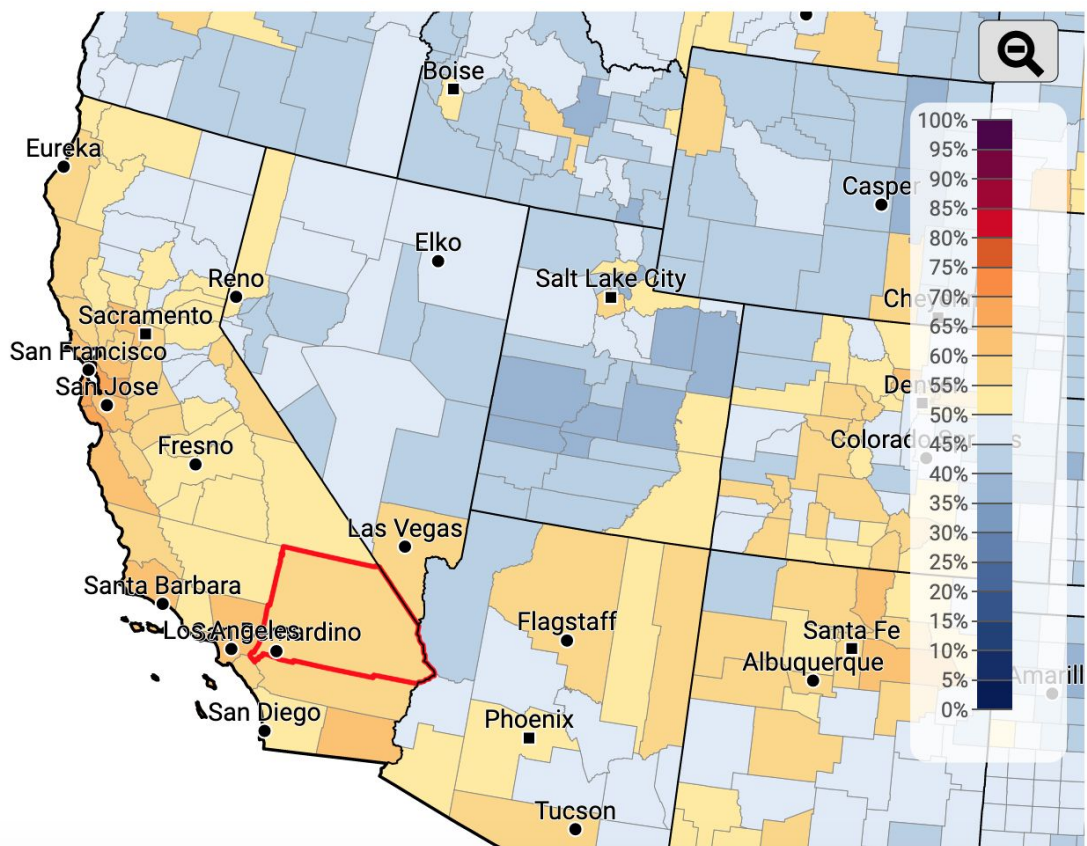
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**Figure 4.** Climate Action Plan in San Bernardino County. Action Plan to Reduce GreenGas Emissions. The climate change plan was created by the county because of a lawsuit by former California governor Jerry Brown (Screenshot by Timothy Do, June 2020. *San Bernardino Associated Governments* and *ICF International*, retrieved July 15, 2020. <https://www.gosbcta.com/wp-content/uploads/2019/10/Final-Plan-.pdf>)

Despite environmental problems, everyone in the city is committed to changing the poor air quality and environmental crisis (See Fig. 5). At the school level, San Bernardino Valley College has an Environmental Science program that focuses on environmental issues that will have an impact on the quality of life, business, and government. Crafton Hills College offers an associate degree in Fire Technology as well as State Marshall Accredited Certification/Fire Fighting Technology. Students will learn about fire behavior, principles of emergency services, and building construction for fire prevention. At the level of social organization, the Southern California Mountains Foundation supports youth development through conservation initiatives integrating environmental education. San Bernardino Valley Audubon Society strives to bring people to their natural environment. It is focusing on birds and other wildlife.



**Figure 5.** Opinion that Global warming is caused mostly by human activities and what percentage for San Bernardino. Between 60% to 65% of San Bernardino County residents believe climate change is caused by human activities.

(Screenshot by Depei Xu, July 2020. Yale Climate Opinion Map, *Yale Program on Climate Change Communication* retrieved July 16, 2020).



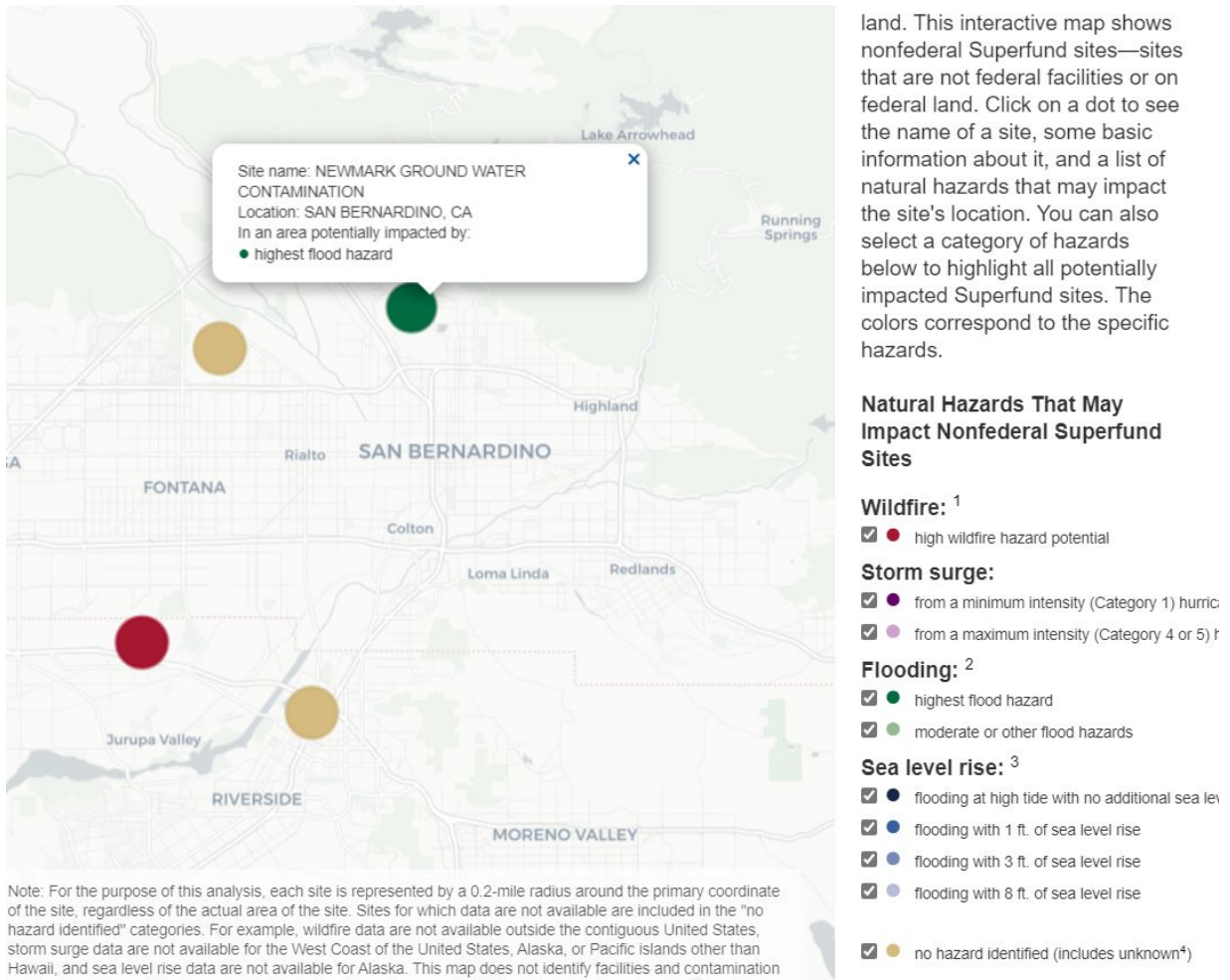
## **SECTION 2: Climate Change as Combo Disaster**

### **[April Godinez and Tahis Alcantar]**

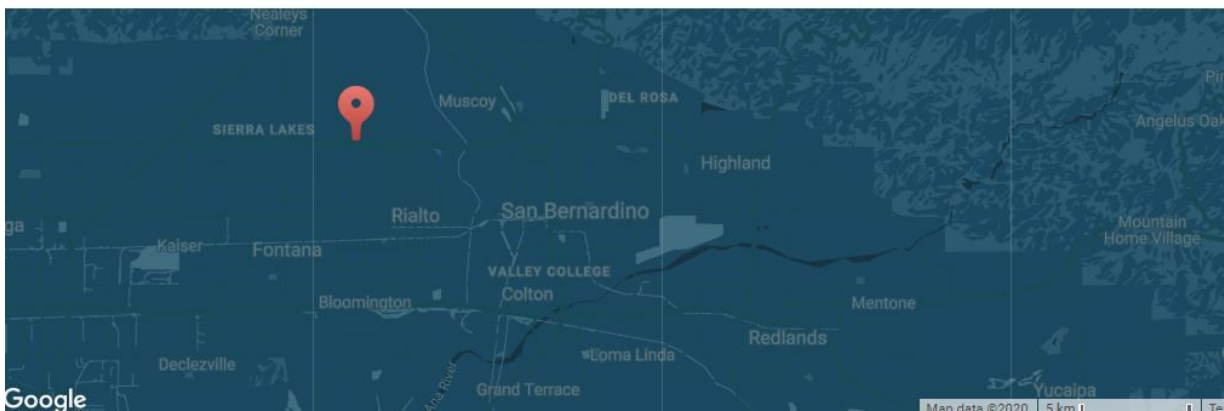
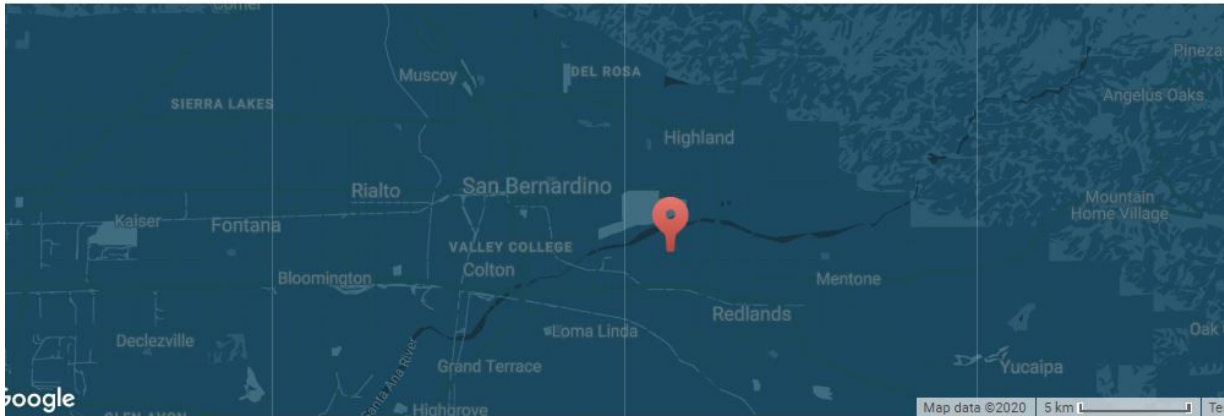
As one of the largest counties, San Bernardino county is no exception to the growing number of environmental health threats in the state. San Bernardino County has a number of environmental health threats from superfund sites, such as the Newmark Groundwater Contamination site near heavily populated areas, toxic sites, and high risks of wildfires. In San Bernardino County, there are a few Super Funds and toxic sites, like that of the B.F Goodrich site (see figure 7, image 2).

From the GAO (Government Accountability Office) website, which is dedicated to mapping out the risks natural hazards have and how they can impact non federal Superfund sites. If you take a look at figure 6, it is clearer to see that there is a site in Newmark with contaminated water in San Bernardino County, if there was flooding in the future it has the potential to contaminate the residents drinking water like that of the, "Site on the San Jacinto River, floodwater eroded part of a containment structure for dioxin-laden waste ( Interactive Graph 2019)". Natural hazards aren't the only things the residents of San Bernardino County have to worry about, they also have a few Toxic Sites they need to be aware of (see Figure 7). One example can be seen in figure 7 at the B.F Goodrich site which "includes areas of groundwater contamination downgradient of the 160-acre area" (Toxic sites 2012). As of today, there have been attempts to clean the site but it still qualifies for the Superfund National Priority List.

## Superfund Sites and Climate Change



**Figure 6.** The image depicts environmental hazards that may affect a non federal superfund site. The GAO website, “uses available data to identify Superfund sites in areas that may be impacted by wildfires and different types of flooding”. The green circle depicts a flood hazard that could cause a superfund site to contaminate groundwater (Screenshot by April, June 2020. Superfund Sites and Climate Change, *U.S. Government Accountability Office*, October 18, 2019, retrieved June 29, 2020).



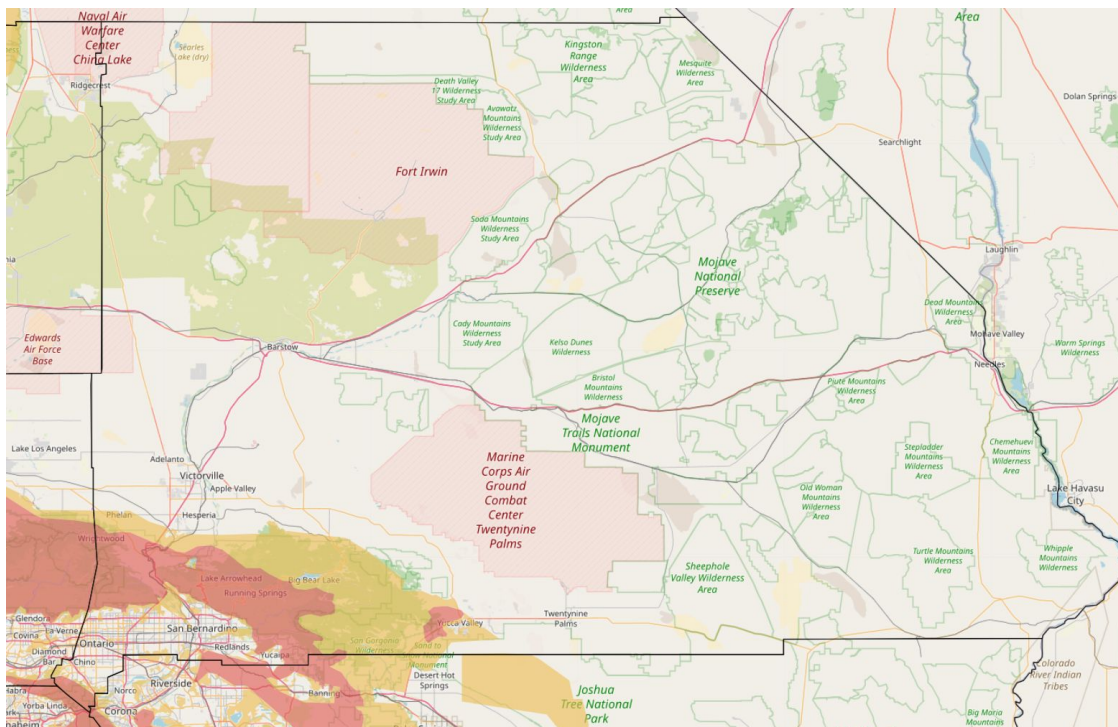
**Figure 7.**

**Image 1 (top):** Depicts the Norton Air Force Base (Landfill #2). Pollutants: “Past hazardous material management practices included burial of drums and other unspecified materials; disposal of waste oils, solvents, and paint residues into landfills, unlined pits, ponds, and drying beds; storage of contaminants in leaking underground tanks and; spills of gas, oils, solvents, polychlorinated biphenyls (PCBs), and acids” (Screenshot by April Godinez, June 2020. *ToxicSites*, retrieved June 29, 2020).

**Image 2 (bottom):** Depicts B.F Goodridge or also known as the Rockets, Fireworks, and Flares (RFF) Site. “The Basin is an important source of drinking water to residents and businesses in the cities of Rialto, Colton, and Fontana. The 160-Acre Area was part of a larger area used by the United States Army in the 1940s as inspection, consolidation, and storage facility for rail cars transporting

ordnance to the Port of Los Angeles. Since the United States sold the Rialto property in 1946, the 160-Acre Area has been used by defense contractors, fireworks manufacturers, and other businesses that used perchlorate salts and/or solvents in their manufacturing processes or products”(Screenshot by April Godinez, June 2020. *ToxicSites*, retrieved June 29, 2020).

The residents in the County also have a high risk of wildfires. A news article in vox better explains why the San Bernardino county is so prone to wildfires, "the wildfire that smashes all of California’s previous notions of “the worst that could happen” begins with an illegal firecracker set off by campers in the San Bernardino National Forest (Barclay 2019)”. In figure 8, it is clearer to see the higher risk areas that are more likely to have wildfires. The CPUC (California Public Utilities Commission) designed their map to highlight elected and extreme possibilities of wildfires in the area as we can see in the image the worst-case scenarios are extremely close to residential areas in San Bernardino County.



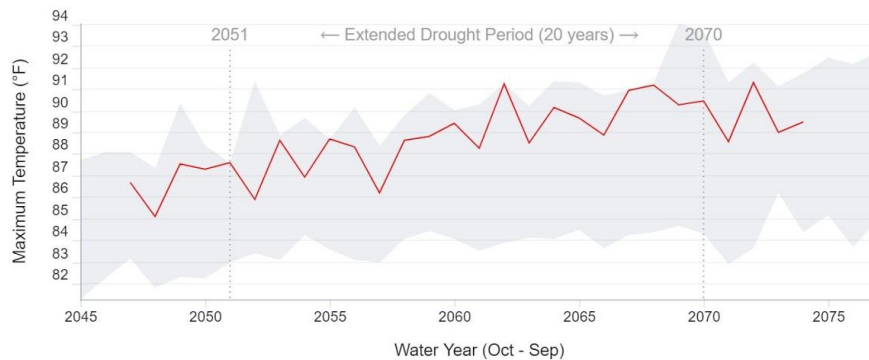
**Figure 8.** The CPUC Fire map highlights the areas in San Bernardino County, with the high risk of fires. (Screenshot by April, DATE, 2020. Fire Map, *California Public Utilities Commission*, retrieved June 29, 2020) <https://ia.cpuc.ca.gov/firemap/>)

San Bernardino County is located in inland California and has a population of over two million people (Census 2019). Over two million people call this County their home and have to endure any environmental or pollution thrown at them.

Due to climate change, the county will soon be expected to experience extreme heat days (Western Riverside Council..., n.d). The rising heat will lead to other disasters such as wildfires, drought, flooding, and low air quality. During a ten-day period heatwave, in Riverside County, it was reported that about six people ranging from ages thirty-seven and ninety one died possibly linked to high temperatures (Bloom 2018). Although this is not San Bernardino County it is still possible for this county to experience the same tragedies. The elderly are put at risk when it comes to extreme heat and it is more dangerous when they have underlying health problems. As seen in figure 9 the average temperature was around eighty degrees from 1961 to 1990, but with the rise in climate change, heat is expected to increase by eight percent from 2051 to 2070 (Cal-adapt n.d).

## Maximum Temperature

Maximum daily temperature which typically occurs in the early afternoon.



OBSERVED HISTORICAL  
1961–1990 Average

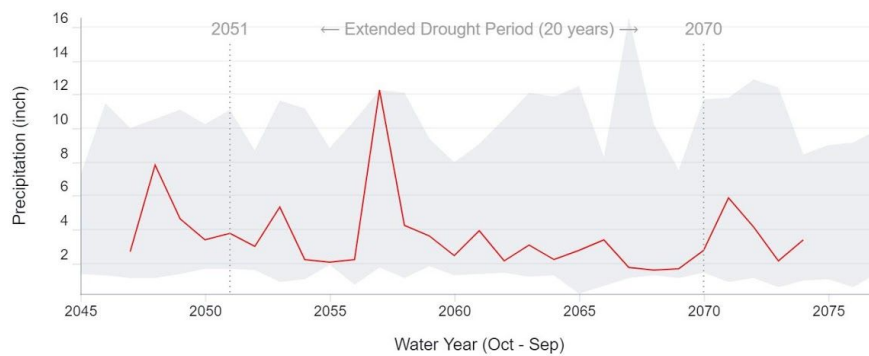
80.3 °F

DROUGHT SCENARIO  
2051–2070 Average

88.9 °F

## Precipitation

Accumulated rainfall and snowfall.



OBSERVED HISTORICAL  
1961–1990 Average

4.5 inch

DROUGHT SCENARIO  
2051–2070 Average

3.3 inch

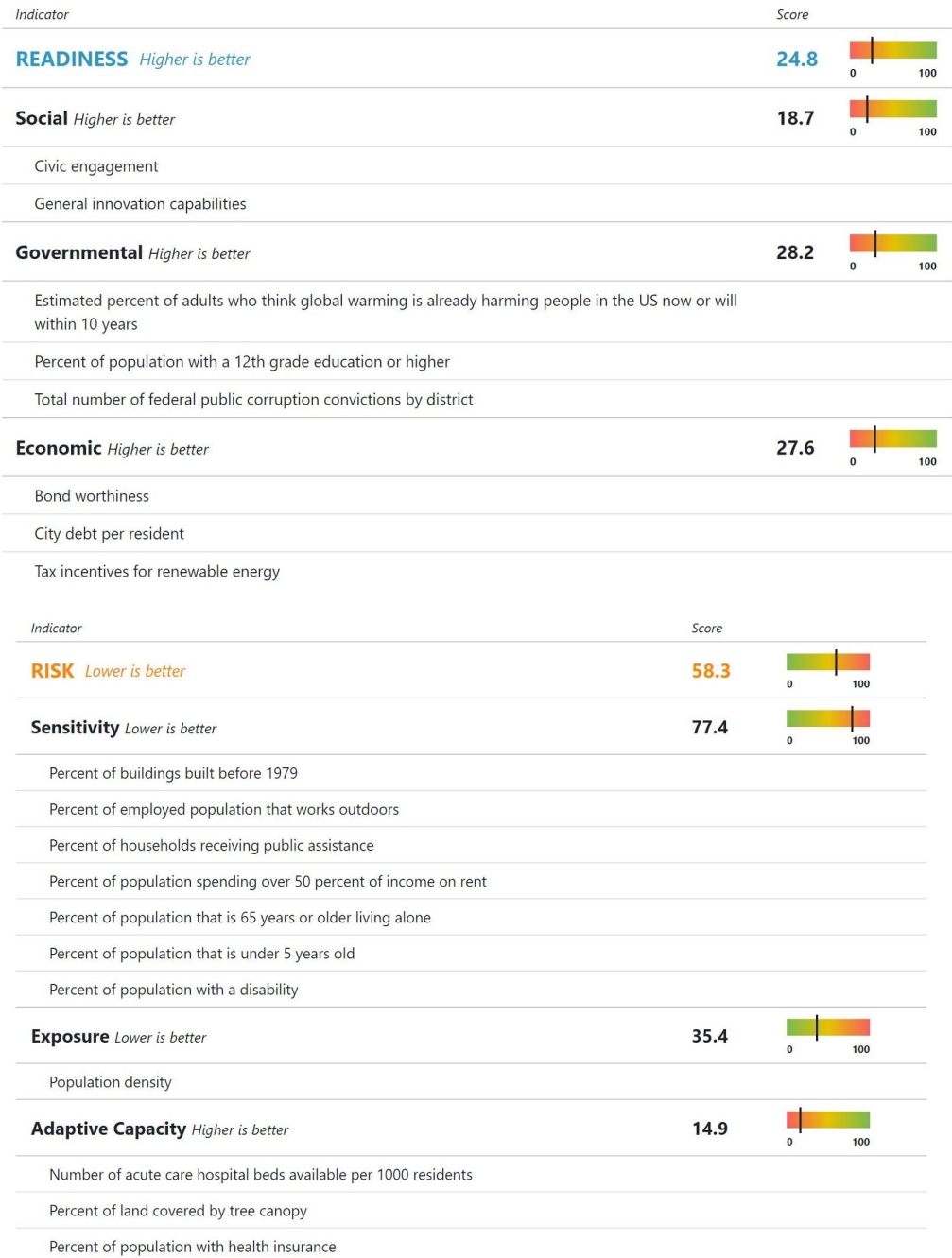
**Figure 9.** This data predicts temperature rising and a decrease in water. (Screenshot by Tahis Alcantar, July 2020. Future Extended Drought, *cal-adapt*, retrieved July 17, 2020.)

The rise in heat contributes to drought and figure 8 includes a diagram of decreased rainfall and snowfall by 1.2 inches (Cal-adapt n.d). The County relies on imported water and with the predicted amount of snowfall expecting to decrease the County will have less precipitated groundwater available to them. This will lead them to purchase more water from outside sources.

The change in weather alters its conditions like the summer storm in San

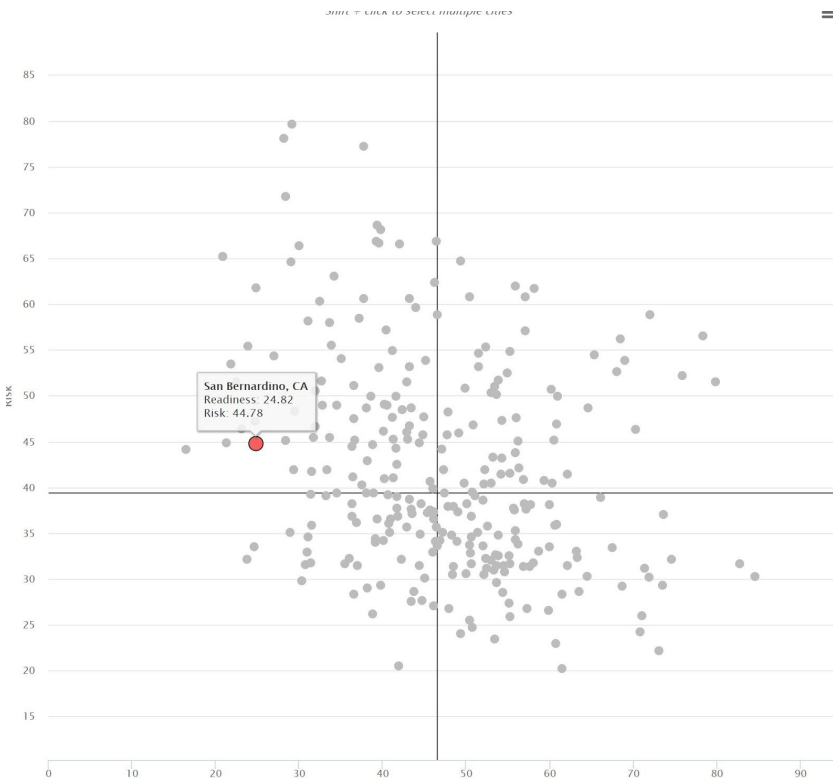
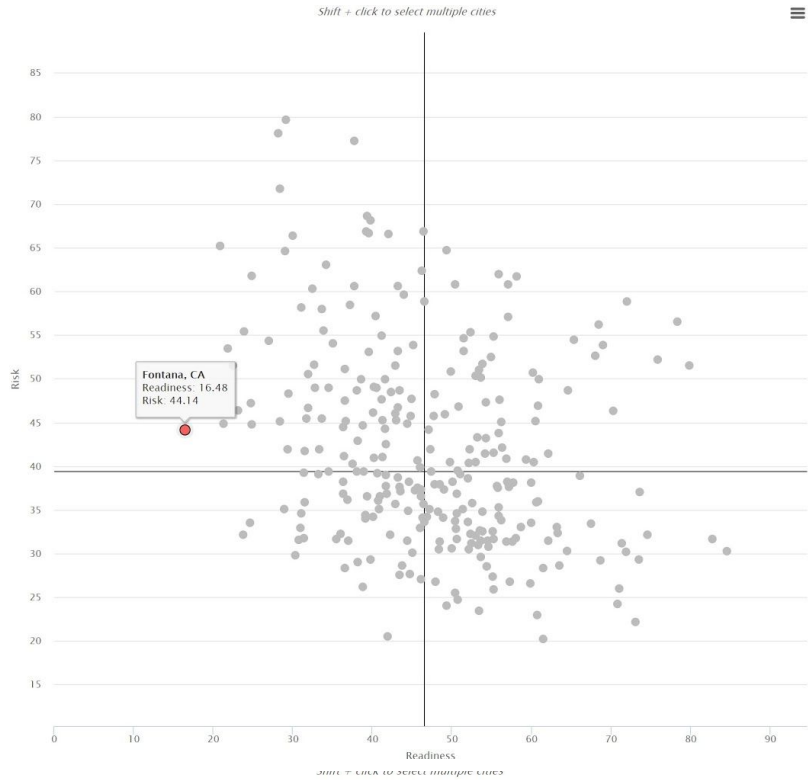
Bernardino County that caused hundreds of residents to be stranded in their homes and a man to lose their life in a flooded creek (Hashim-Waris 2014). "Climate models suggest that extreme precipitation events may become more frequent and intense, primarily because warmer temperatures increase the amount of water vapor in the atmosphere," (AghaKouchak et al. 2018, Pierce et al. 2018). For the case of the 2014 flash flooding, it was only that one man, but with the possibility of more flash floods to come more people are at risk of getting injured or worse.

Figure 10 displays the predicted readiness for the city of San Bernardino's social, economic, and governmental when handling the increase in heat. The data demonstrate very low scores for the potential of very moderate to high risk scores for sensitivity, exposure, and adaptive capacity (University of Notre Dame, n.d.). This means the County has not prepared their cities for climate change and they have not fully understood the dangers of it as seen in the city's data on figures 10, and 11.



**Figure 10.** The readiness in the city of San Bernardino predicts low scores in social, government, and economic. The risk score is high in sensitivity, moderate in exposure and low in adaptive capacity. (Screenshot by Tahis Alcantar, July 2020. Urban Adaptation Assessment, *Notre Dame Global Adaptation Initiative*, retrieved July 16, 2020. <https://gain-uaa.nd.edu>)

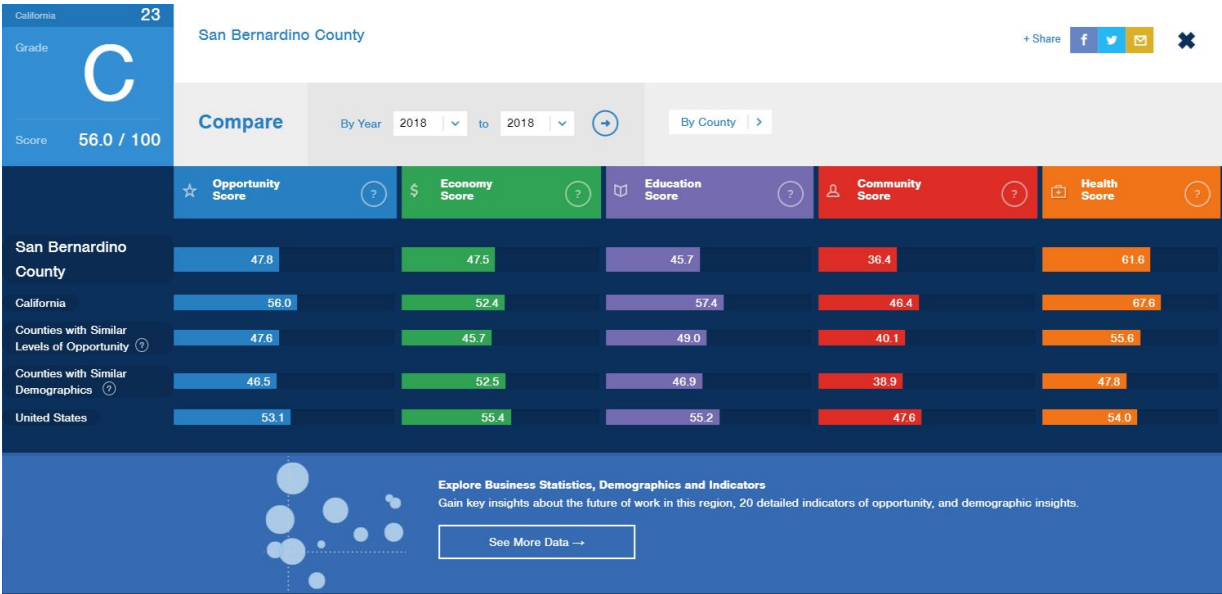




**Figure 11.** The readiness in the city of San Bernardino predicts low scores in social, government, and economic. The risk score is high in sensitivity, moderate in exposure and low in adaptive capacity. The readiness in the city of Fontana predicts low scores in social, government, and economic. The risk score is moderate in sensitivity, low in exposure and moderate in adaptive capacity. (Screenshot by Tahis Alcantar, July 2020. Urban Adaptation Assessment, *Notre Dame Global Adaptation Initiative*, retrieved July 16, 2020. <https://gain-uaa.nd.edu>)

# SECTION 3: Compound Vulnerabilities [Timothy Do]

There are many intersecting factors which affect the social life of residents in San Bernardino County. Using the Opportunity Index - a scale that ranks a community's quality of life into five distinct factors - we can assess the overall opportunity a community has for its residents ("What is the.." , n.d.). The County of San Bernardino gets a "C" grade for the overall rating in the opportunity index, meaning people here have far fewer opportunities than in other communities. (See Fig. 12 for All Indexes). We can further address why the county is graded so poorly by looking into individual sectors: economy, education, health, and the overall community.

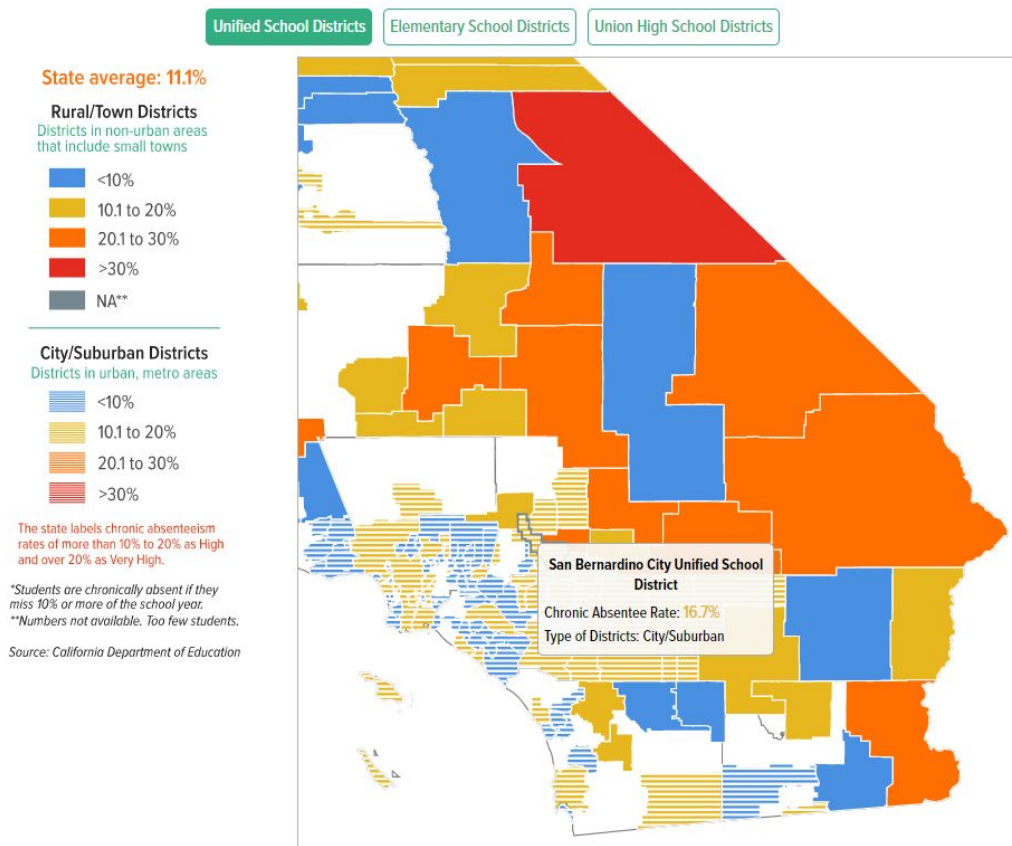


**Figure 12.** The Opportunity Index of San Bernardino County. All scores except Health were lower than the State and National Average. (Screenshot by Timothy, June 2020. *Opportunity Index*, retrieved July 15, 2020).

For the economy rating of the opportunity index, it takes into consideration the unemployment rate, residents below the poverty line, as well as access to banking services (“Data & Scoring”, n.d.). The Opportunity Index ranks San Bernardino County a score of 47.5 out of 100, lower than the national average of 55.4 (“San Bernardino County”, n.d.). There are certain indicators that yield the county’s low score: according to City-Data, the median household income in San Bernardino County is \$60,420, 15% lower than the state average of \$71,805 (City-Data, n.d.). Additionally, 16.2% of San Bernardino residents live under poverty compared to 13.3% at the state level (City-Data, n.d.). It is important to note when comparing the ethnicities under poverty in this county: minorities like Hispanics and Blacks have higher rates of poverty than Whites (18.3% & 21% compared to 11.3%, nearly double the rate) (City-Data, n.d.). The insufficient wages of this community, along with the disproportionate ratios of minorities in poverty, contribute to the economic disparity in San Bernardino County, leaving it vulnerable to environmental racism and poor living conditions for marginalized communities.

Going into the education portion of the opportunity index, it weighs in the percentages of preschool enrollment, high school graduation, and the proportion of college degrees in the adults in the community (“Data & Scoring”, n.d.). San Bernardino achieves a score of 45.7, 7 points lower than the national average of 55.2. The lack of education compared to the rest of the country could be attributed to one variable: chronic absenteeism in schools. In San Bernardino County, three major school districts: San Bernardino Unified, Baker Valley Unified, and Needles Unified, all have chronic absentee rates well above the statewide average of 11.1%: 16.7, 21.2, and 20.3 percent respectively (See Fig. 13 for a visual comparison in other areas). The San Bernardino Unified District saw this as a concern, and when going “Operation Student Recovery” to discover why students were chronically absent, they found that some students “have medical issues...don’t have good

access to healthcare”, and some parents don’t know “why they need to get their child to school.” (Evan 2019). The lack of exposure of the county’s youth to education explains why there are not many adults with bachelor's degrees: only 20.9% of 25-year-olds or older have bachelor's degrees in San Bernardino County (City-Data, n.d.). Not having a proper education means that higher qualified jobs are not being filled up, further contributing to low incomes of San Bernardino county that could be an injustice to the community.



**Figure 13.** Chronic school absentee rates for San Bernardino City Unified School District. Across 3 major school districts in San Bernardino County there were rates nearly double than the state average. (Screenshot by Timothy Do, June 2020. Chronic School Absentee Data, *EdSource*, retrieved July 15, 2020).

When assessing the health of a population, the opportunity index factors signs of developmental risk, health outcomes, access to healthcare, and many other factors ("Data & Scoring", n.d.). Surprisingly, the health score for San Bernardino County is quite decent: rated 61.6 out of 100, it is higher than the national rating of 54 but lower than the state average of 67.6 ("San Bernardino County", n.d.). This raise in their health score can be explained by the number of health workers in the county job market: 18% of Males and 21% of Females working had a job in the Health care and social assistance industry (City-Data, n.d.). Despite a majority of workers being in the healthcare industry, it is important to know if residents are properly covered by health insurance. In San Bernardino County, 14.1% of people under the age of 65 don't have health insurance, almost double the rate of the country at 8.6% ("San Bernardino", n.d.). Having this many people not covered in the case for accidents like wildfires could be deadly; they could be in a worse financial burden than before.

Looking at the county as a whole, the criteria from the Opportunity Index is broadened: youth not in school and not working, violent crimes, to the number of grocery stores in the area ("Data & Scoring", n.d.). San Bernardino County gets a measly score of 36.4, a staggering 13 points lower than the national average of 47.6 ("San Bernardino", n.d.). This low score is the factor of many lacking components of the community. The absence of medical doctors is worth noting: 57.3 medical doctors per 100,000 people compared to 75.4 doctors nationally ("San Bernardino", n.d.). Grocery stores are not as accessible as well: only 1.5 stores for 10,000 residents compared 2.1 nationwide ("San Bernardino", n.d.). Along with many other intersecting factors previously mentioned, the communities in San Bernardino County have underlying vulnerabilities that could endanger their residents' quality of life.

## **SECTION 4: Stakeholder Analysis [Huiqi Mai]**

The stakeholders are the local or non-local individuals that have influences on or impacted by the climate changes in the problem area. In this section, we will be discussing five major stakeholders in the County of San Bernardino and their perceptions of this case.

Amazon warehouses are intended to store and organize returned products from the customers. Through the warehouses, they can find great deals on pre-owned products with an acceptable condition. There are sixteen large warehouses located in California and seven of them are running in the County of San Bernardino (Avalara, n.d.). The company now has employed 15,000 full-time workers and lowered the unemployment rate from 15 percent in 2012 to 5 percent in 2018 (Semuels 2018). Although it improves the financial conditions in the county, its delivery trucks are generating massive amounts of greenhouse gases, which are the main ingredients for bad air quality (see Fig. 14). According to the *New York Times*, due to the current pandemic of Covid-19, the lockdown has driven higher demand of goods online (Cowan 2020). This means that trucks will be operating more frequently than usual. As a result, it will be more likely to increase the chance of climate change. The locals complain about their toxic pollution, but there is no response from Amazon about improving the condition (Knoblauch 2020).

The local residents in the County have the most direct exposure to the potential climate changes impacted by the bad air quality. Some of the vulnerability zones are located in the cities of Victor Valley, Morongo Basin, Barstow, and Lucerne Valley. They are densely populated areas, so residents are exposed to high contaminants produced by constructions, unpaved highways, and transportation every day. Not only the vulnerability areas, but major cities like Chino, Ontario,

Rancho Cucamonga, and San Bernardino are also suffering from the bad air quality (Lilburn Corporation 2015). According to an interview performed by the EarthJustice organization, residents in the county are seeing dark smoke of emissions coming out from trucks and vehicles and experiencing difficulty in breathing. Hence, they are protesting for large-scale transportation companies to buy zero-emission electric trucks and expect changes to reduce pollution (Knoblauch 2020).

The South Coast Air Quality Management District (South Coast AQMD) is a local government agency responsible for clean air quality in California. Their main mission is to control toxic emissions in both businesses and residences. They construct environmental management plans that outline steps to improve air pollution and promote better air quality. In 2018, they have specifically designed a pollution reduction plan for the County of San Bernardino, called Community Emission Reduction Plan (CERP). In the program, they have composed live-meetings with various stakeholders, such as the Department of Public Health in San Bernardino County and San Bernardino Valley College, discussed possible solutions for air pollution (South Coast AQMD 2018). Even though they worked hard for the county, they don't have the privilege to enforce the law on those major businesses and transportations that produce massive chemicals to the air.

The Environmental Protection Agency (EPA) is a non-local, federal government agency of the United States. Their main goal is to protect human health and provide a healthy environment. They have the authority to implement laws and regulations on states and run programs to prevent and manage environmental crimes. have a field office in Los Angeles that works closely with local agencies in San Bernardino, Riverside, Orange, San Diego, Santa Barbara in an attempt to address environmental concerns more effectively (United States Environmental Protection Agency, n.d). Though it has power over states and businesses, it doesn't manage every concern and doesn't focus mainly on one area,



which also means that it doesn't pay full attention to San Bernardino itself.

Lastly, EarthJustice is a nonprofit public environmental law organization. They focus on combating climate changes and promoting clean energy throughout the United States. Although they don't have state power like the EPA, they have hired over 130 full-time lawyers that use legal strategies to help local residents fight for environmental justice. Specifically to San Bernardino County, EarthJustice thinks that the Amazon warehouses contribute a lot to ozone pollution. Thus, they have decided to sue the Federal Aviation Administration for failing to address the environmental impact of the Amazon fulfillment centers on local residents. As a result, they have successfully stopped the construction of a new warehouse facility (Knoblauch 2020).



**Figure 14.** The photograph portrays Amazon's 406,000 square foot warehouse in the city of San Bernardino. It also shows that the massive amount of trucks are parking in the warehouse and waiting for business. The operating trucks present

in the warehouse emit greenhouse gases like carbon dioxide, ozone, and particulate matter that may contribute to climate change. (Photo by Birtcher Development, January 20, 2020, retrieved on July 15, 2020).

## **SECTION 5: Stakeholder Actions [Wonhee Lee]**

Regarding the environmental problems in San Bernardino County, stakeholders have taken different measures in confronting the issues of the community. County department of transportation promised to make a San Bernardino line of a zero-emission train, powered by a hydrogen fuel cell (Scauzillo 2019). Hydrogen cell is a battery that uses the chemical reaction of hydrogen and oxygen to produce energy and emits water vapor but no pollutants (Scauzillo 2019). However, the county department of transportation did not mention other renewable transportation than this.

Mojave Solar Thermal Power Facility is a 250MW solar thermal power facility located in San Bernardino County (Power Technology, n.d.). It generates enough energy that 5400 households can use, and that reduces 355,000 tons of carbon dioxide emissions per year (Power Technology, n.d.). PG&E purchased the power from this facility as a part of a 25-year power purchase agreement with Abengoa Solar (Power Technology, n.d.).

San Bernardino County and several environmental organizations sued Fontana, a city in San Bernardino County, over its approval of a massive warehouse complex (Emerson, 2019). They pointed out that the warehouse complex will add more than 6,000 daily vehicle trips, which would produce more air pollution, noise, and traffic (Emerson, 2019). The Sierra Club and the Center for Community Action

and Environmental Justice, mentioned that the project would harm critical habitat for animals and destroy a wildlife corridor (Emerson, 2019).

The San Bernardino County Board of Supervisors launched environmental stewardship in the County as a part of its general plan in 2007 (County of San Bernardino, 2009). The mentioned that the county is responsible to minimize the potential negative impacts to the County while supporting a prosperous community and economy (County of San Bernardino, 2009). However, they banned the development of renewable energy projects in San Bernardino County on private land, except for Community Oriented Renewable energy in 2019.

The California Assembly and Governor passed and approved the law that would mandate renewable energy sources account for 50% by the very end of 2026 and 60% by the end of 2030 (De Leon 2018). It sets a target of 100 percent carbon-free electricity by 2045 (De Leon 2018). However, still some California lawmakers are protecting companies like PG&E. They blame the mismanagement and greed for the Bay Area Blackouts, instead of the climate change (Endicott 2019).

San Bernardino Land Use Service provides a Fire Hazard Abatement program that offers tips on how to control vegetation around the home to reduce fire risk (San Bernardino n.d.). They also have an enforcement policy included in their general program (San Bernardino n.d.). However, they have not made this program more aggressive. They are currently operating the program by complaint .

The United States Forestry Service prohibited campfires, smoking and portable stoves in national forests to protect the forest from fire (United States Department of Agriculture, n.d.). They also use 'controlled burning' (See Fig. 15) as part of their strategy of managing the forest. Controlled burning is igniting a fire intentionally under control to meet specific land management objectives (United States Department of Agriculture, n.d.). It causes smoke for inhabitants, but it is necessary for reducing the risk of wildfires.



**Figure 15.** Controlled burning to decrease fuels in San Bernardino National Forest. These efforts decrease the dry vegetation that can easily ignite during a wildfire, by burning up these resources. It is a tactic used by the U.S Forest Service to mitigate the severity of wildfires. (Photo by San Bernardino National Forest, Nov 22, 2019, retrieved July 15th, 2020)

## **SECTION 6: Role of Media and Big Environmental Organizations [Vince Marin]**

In general because of the size and diversity of Southern California, most articles regarding climate change tend to focus on the entire Southern California region as a whole, mostly reporting the damage that rising sea levels could have on coastal communities.

Stories regarding climate change and environmental issues in San Bernardino County are frequently reported on by high profile news organizations. The New York Times recently ran an article highlighting how warehouse workers in San Bernardino County are more vulnerable to contracting COVID-19, especially workers that are Latinx and Black (Cowan 2020). In 2016 Scientific American magazine put Joshua Tree National Park, a popular tourist attraction within the county, on the list of parks at most risk of damage from climate change. Scientific American claimed local temperatures will resemble those of Abu Dhabi, and the heat will kill the famous Joshua trees (Kahn 2016).

Due to its proximity to Los Angeles County, San Bernardino County receives a fair amount of news coverage from the Los Angeles Times. A recent article, from 2020, examined the opposition San Bernardino County has been receiving from residents to install more wind turbines. These wind-farms are found throughout the county and help generate renewable energy for the county and state (Roth 2020), however locals claim these wind-farms create larger dust storms and are unattractive.

A local news source, the San Bernardino Sun, goes into more detail about

issues regarding the county. The Sun covered Bernie Sanders', once a democrat presidential contender, visit to Moreno Valley in 2019. Sanders directly addressed some environmental issues affecting the county, high air pollution due to the trucking industry, and how his plan would have helped solve these problems (Emerson 2019). Another 2019 article also warned of the possibility of Joshua Tree National Park (See Fig. 16) being wiped out by wildfires in the not too distant future.

Local organizations have been vocal about climate change and the effects it will leave within the county, and they have also had legal battles to help combat environmental injustices.. In 2019 three environmental groups, the Center for Community Action and Environmental Justice, the Sierra Club, and the Center for Biological Diversity, sued the City of Fontana and the County of San Bernardino for approving plans to build an industrial business park that would include a 3.4 million-square-foot facility (Emerson 2019). The groups claimed that the complex would put several enlarged species at further risk and would create significant amounts of pollution. Eventually the groups settled the lawsuit after the developer agreed to reduce air pollution and make the project more energy and water efficient. These three groups then sued the City of Fontana again, after a housing development was approved by the city (Emerson 2019).

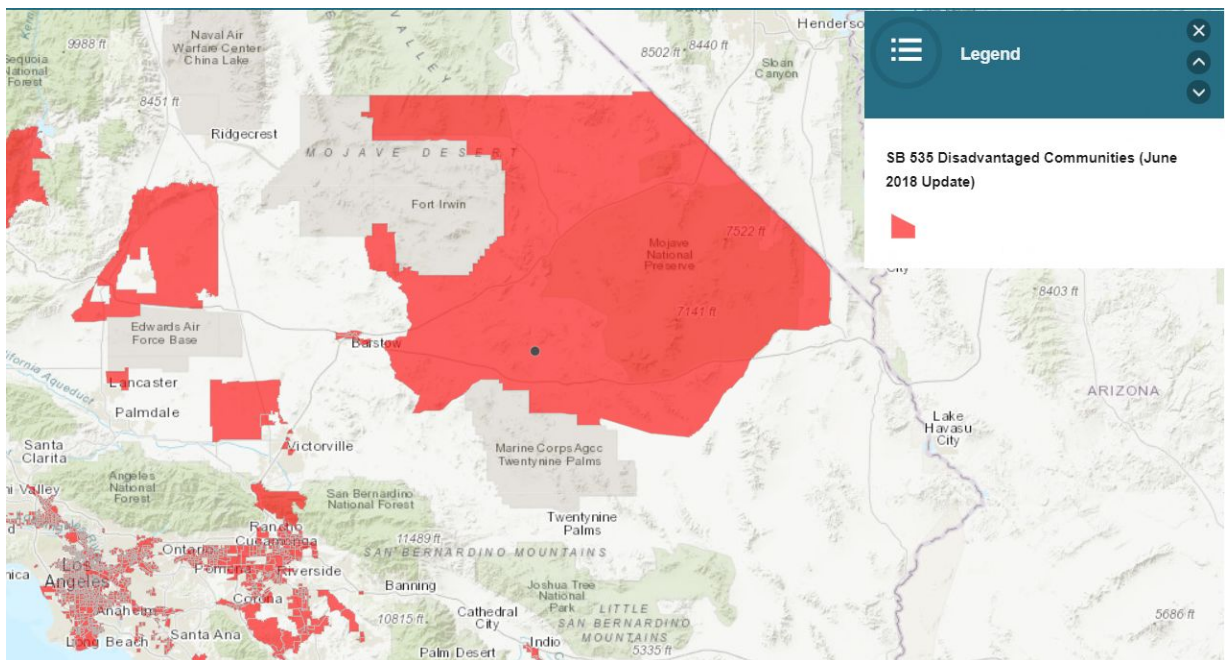


**Figure 16.** A member of the Mojave Desert Land Trust collects seeds at Joshua Tree National park. It is an example of environmental coverage of climate change's effect on national monuments. (Photo by Jennifer Cappuccio Maher, October 9 2019, Director of Mojave Desert Land Trust, walks through Joshua Tree, retrieved July 15, 2020)

# SECTION 7: Recommended Local Actions

## [Daniel Jilani]

Wildfires are an elevated risk in San Bernardino County for residents and local businesses. Climate change produces warmer temperatures in the area which create fuel sources from dry shrubbery and trees (Barclay 2019). One of the growing and priority solutions to California wildfires in California and San Bernardino County sounds counter-intuitive: add more fire. Combining this with other fire prevention and protection efforts (see Fig. 17) that have been launched by the San Bernardino County Fire Department and other government offices to mitigate wildfire damage to homes and the San Bernardino National Forest. However, efforts to mitigate wildfires catalyzed by climate change through renewable energy infrastructure have been severely resisted by the community due to land allocation disputes.





**Figure 17.** A high concentration of disadvantaged residents are located near the San Bernardino National Forest. Increasing investment in fire hazard prevention and protection in these areas will protect homes and other property assets, and hopefully mitigate the billions of dollars in damages caused by wildfires. (Screenshot by Daniel Jilani, June 2020. SB 535 Disadvantaged Communities Map, *CalEnviroScreen 3.0*, retrieved June 29, 2020).

The saying “fight fire with fire” has never been so fitting. In Big Bear, the San Bernardino National Forest is being given “prescribed burning,” which at the time had reduced the number of fuels within 200 acres (Victor Valley News 2020). According to the U.S Forestry Service, controlled burning (also known as prescribed burning) reduces the threat, controls the intensity, and limits the location of wildfires (United States Department of Agriculture, n.d.). A controlled burn is an intentionally set fire during a time that meets certain criteria such as a specific objective, fuel moisture, air quality, wind speed, etc (United States Department of Agriculture, n.d.). Typically, there are 50 days in a year where a controlled burn can be used (United States Department of Agriculture, n.d.). It is critical and should be the number one priority for the San Bernardino County Fire Department and U.S Forest Service to cooperate to administer these burns such as in Big Bear. The San Bernardino County Fire Department website does not report if it uses controlled burns as part of its wildfire prevention program. However, implementing it into the program (if not already) will reduce the potential amount of fuels that a wildfire would have access to.

San Bernardino’s Land Use Service recommends mowing and weeding vegetation within 100 feet of a homeowner’s home (if not more), trimming trees on the property, planting fire-safe vegetation around the home, and replacing flammable roof shingles with Class A material (“Protect Your Home,” n.d.). Land Use Service also enforces these in its fire hazard abatement program by surveying

properties in San Bernardino County and issuing a Notice and Order to Abate which then administratively and financially escalates if compliance is not met within 30-days (San Bernardino County Fire...,” n.d.). However, the office works through a complaint system (“Complaints,” n.d.). To effectively prevent home damage the Land Use Service needs to operate more dynamically and aggressively. Fire season is between May and October, during this time Land Use Services should conduct routine inspections for a certain quota of homes starting with homes closest to areas historically within or adjacent to fires and areas at high risk. Two months before fire season, Land Use Services should send a newsletter out to the county reminding them of coming hazard issues and instructions to residents on how to protect their homes. The county should also aggressively give notification and reminders to follow the Land Use Service’s instructions on protecting their homes from fire damage during fire season almost weekly. These combined efforts should ensure both voluntary and mandatory compliance; thus protecting homeowners in San Bernardino County through their combined efforts to protect their homes.

San Bernardino County residents however, also want to protect their lands. In 2019, San Bernardino County Board of Supervisors amended the county’s general plan on the subject of renewable energy and conservative elements (San Bernardino County Board 2019, 4:13:14). One resident, Sue Hammer, read an environmental report from the county to the board that stated 32 single family rural resident structures scattered around the area will be adjacent to a renewable energy project’s perimeter by half-a-mile (qtd. in San Bernardino County Board... 2019, 1:36:42). The land used for the facility will mostly be used for storage spaces and parking spots (qtd. in San Bernardino County Board... 2019, 1:37:03). She notes the report is misleading and unfair to her local community that lives in the area as well as no mention of compensation for property, wells, and homes (San Bernardino County Board... 2019, 1:37:13). One of the compromising policies made is Community Oriented Renewable Energy (CORE), which requires more than 50% of the energy generated to be for local consumption (San Bernardino County

Board... 2019, 12:43). The issue is characterized by community assets and renewable energy jobs. One solution may be to replace existing non-renewable energy facilities through a combination of buy-outs, alternative energy negotiation, and increasingly restrictive policy. This protects existing jobs, offers more renewable energy sources, and does not invade upon community assets. A second solution is to fund on-site renewable energy, especially high wildfire risk homes and properties. This offers more renewable energy sources, mitigates fire risk from transmission lines, and protects community assets, but would overall lose energy jobs.

## **SECTION 8: Recommended Extra-Local Actions**

### **[Andrew Ramirez]**

One of the biggest problems that exists in the area is the air pollution, which comes from many different sources. Thus, the most important thing that must be done is to regulate those sources. More specifically, the highest priority action is to reduce the amount of air pollution within the county. The state of California has the California Ambient Air Quality Standards, CAAQS, while the US itself has the National Ambient Quality Standards, NAAQS, which is used to enforce the Clean Air Act (California Air Resources Board, n.d.). Both are quite similar in terms of their exact specifications for what's allowed in the air, so it simply takes one of them to see if those standards are met in the county, which they likely won't, given the overall poor air quality that the county has (American Lung Association, n.d.). Thus, one of two things would need to occur, and be enforced by either California or the US. Either the specific sources for big proportions of the pollution need to be found, to then make sure the issue itself gets fixed, or, should violations by specific groups or companies be small, or non-existent, a revision of the CAAQS or the NAAQS would be needed to ensure that the air quality can improve.

Another solution to that problem, which should be in effect, is the transition from fossil fuels to more renewable forms of energy. The current plan by California is to have 60% of retail sales of electricity to come from renewable sources by 2030, and to have 100% by 2045 (U.S. Energy... 2020). Thus, this solution is already underway. Of course, there are certain things that could be done in order to incentivize quicker improvements. For instance, there could be some government subsidized solar panels available to homeowners.

It's important to note the significance that these solutions bring. Through ensuring that the clean air act is complied with, there are great benefits, which include the prevention of many premature deaths, as well as economic benefits. Those benefits are estimated to be around 3.86 billion USD in 2020, and predicted to be around 5.91 billion USD by 2030 in San Bernardino County alone (Mui and Levin 2020, see Fig. 18).

## San Bernardino County, California

View results for State of California

		2020	2030
Number of avoided premature deaths	Low	363	528
	High	779	1132
Total monetized benefits	Low	\$3,860,000,000	\$5,910,000,000
	High	\$8,190,000,000	\$12,600,000,000
Monetized benefits - avoided premature deaths	Low	\$3,780,000,000	\$5,800,000,000
	High	\$8,110,000,000	\$12,500,000,000
Monetized benefits - avoided cases of non-fatal illness	Low	\$81,800,000	\$112,000,000
	High	\$81,800,000	\$112,000,000

**Figure 18.** The figure shows that a cleaner environment has led to both a reduction of premature deaths and economic benefits. Enforcing the standards of the Clean Air Act may increase health and economic quality. (Screenshot by Andrew Ramirez, July 2020. Clean Air Benefits Map, NRDC, retrieved July 14, 2020).

Another big issue that exists in the area are the wildfires, and the risk to residents that live near high risk wildfire zones. One step being taken at the state level comes from the California Assembly Bill 2367 that requires insurance companies to "write and renew homeowner insurance policies for hardened homes

and communities that meet statewide standard" ("Renew California Bill...," n.d.). This bill came into place as insurance companies began to not renew the insurance of homes at risk of being near wildfires, so this ensures that homeowners get to keep their insurance, as long as they meet fire safety standards. Thus, this comes with the additional requirement that insurance companies must incentivize homeowners to make their homes more resistant to fires. It would make sense, in addition to those state requirements, to require all homes in the county to meet a higher standard of resistance to wildfires, to ensure that all homes have genuine protection.

# **SECTION 9: Recommendations for Future Research [Haoyang Liu]**

As stated by The South Coast Air Quality Management District- a government agency in charge of monitoring the air quality of the western portion of San Bernardino County, pollution can come from combustion sources such as cars, trucks, trains, ships, aircraft, certain types of facilities (see Fig 19), meat cooking, residential wood burning, wildfires and natural sources such as dust storms. Which can cause cardiovascular and respiratory effects in areas near major roadways, ports, railyards, and other combustion sources and inland areas, especially valleys (“Current Air Quality”, n.d.).

Currently, studies have been performed in the field, such as monitoring air quality in the vicinity of specific industrial sites (see Fig. 19) or communities, effects of ambient air pollutants on health, monitoring specific issues such as wood smoke from beach fires, or site-specific investigations. (“Current Air Quality Studies”, n.d). However, these studies are all limited to monitor specific locations, with limited quantitative studies based on them, and this limited field of view has limited the ability to research or locate the major source of air pollution and the portion that each one takes in regions such as the County of San Bernardino in this case. Therefore, computer modelling based on big data gathered from as many monitoring pieces of equipment as possible should be utilised in future on a national, or even global scale to pinpoint major contributors of pollution and climate change, to study their contribution to the overall air quality, to enable stakeholders to make the most appropriate and efficient actions halt the progress of climate change and their health effects with minimal disturbance to our current ways of living.

Based on a published study called Earth observation big data for climate change research by Guo, Zhang, and Zhu, "Earth observation technology has provided highly useful information in global climate change research over the past few decades and greatly promoted its development, especially through providing biological, physical, and chemical parameters on a global scale." In the era of global environmental change, earth observation big data can play an essential role in decision making. (Guo, Zhang and Zhu 2015). Historically, such predictions are limited with the amount of data available, and the resolution of the satellite in orbit, which are only capable of producing a general prediction for a short period of time with accuracy. Nevertheless, if more data could be entered accurately into the model, closer to the "initial state" of the model, we can get to produce predictions with a higher degree of accuracy. (ECMWF, n.d.). County of San Bernardino could, in this case, be used as an experimental unit due to its vast area of land, diversified terrains and utilisation of energy to construct a conceptual model to monitor and predict climate change and its effect on the people, with the assistance from the government with enough health data (detailed health surveys and medical histories) and active atmosphere analytical equipment. If the modelling was done correctly, based on our current understanding of earth science, influence decisions on the local climate and people based on the degrees of human intervention, and the correlation between climate and health could be calculated with degrees of accuracy for future decision making. However, since climate change happens on a global level, only a model at a grander scale would be useful in terms of studying the effectiveness of different climate-related decisions. Unfortunately, before such a model is available to the public, only precautionary measures on the climate could be taken to prevent us from getting to the point of no return.





**Figure 19.** High Value Data Point - Steel Worker Checking Contents of Furnace Traditionally, Producing Temperatures Over 3400 Centigrade (Photo by Heine Schneebeli, September 2018, retrieved July 16, 2020).

## **SECTION 10: Injustice Analysis [Jiaqi Wu]**

In many cases, when people have a lack of fairness or justice, it means they are experiencing injustice. There are a number of different forms injustice can take, but they are all very harmful.

First of all, a very common injustice is the spread of unequal information. Some companies or even the media often keep real information hidden. In many cases, residents are easily misled by the spread of incorrect or incomplete information, thus failing to clearly realize their situation. For example, Sue Hammer, a resident of San Bernardino County, pointed out that at the San Bernardino County Board of Supervisors special meeting, the wrong data was used locally (Special Meeting of the Board of Supervisors 2020).

Another common pattern is economic injustice. This injustice is not unilateral, but spread from the economy to many other levels. "Decades of discriminatory policy decisions across the United States, from land use and zoning to mortgages and lending practices, have strategically deprived low-income communities of the color of their economic, civil and political rights, Victoria says" (Creative 2019). We can see that the contradictions caused by the economy are often the source of many difficulties (see Fig. 20A). When the overall national saving rate is not high, the economy is even more difficult for the poor residents of San Bernardino County. On the other hand, many low income residents cannot afford expensive equipment, such as installing air filters in homes; on the other hand, it is difficult for the federal government to unconditionally subsidize all poor people because it may be unfair to other taxpayers. Therefore, in order to balance the protection of the health of the poor and the interests of most people, various consultations are required.

From another perspective, medical injustice is a branch of economic injustice. Many times, the poor are not simply unable to pay for medical expenses. Many times, they also have difficulty paying the time cost of medical treatment. "Indeed, as it turns out, the median American household has only \$11,700" (Kathleen Elkins 2018). As a very simple example, in California, Covid-19 caused many people to suspend their work. For those poor families, the seemingly free medical prevention method of home isolation actually costs huge economic costs: the loss of income for low-income people means that they cannot pay rent, utilities, tuition, etc. For some low-income people, going out to work may increase the risk of infectious diseases, but they have no choice. In San Bernardino, Latinos are most at risk. (See Fig. 20B) Therefore, the means of dealing with medical injustice should be linked with the method of dealing with economic injustice, from reducing medical expenses, providing jobs, giving additional subsidies for the treatment of occupational diseases and infectious diseases, etc.

Another distressing injustice is that caused by racial inequities (see Fig. 20C). This injustice is not as direct as other injustices, but an indirect injustice. "Starting in the 1990s, a 15-square-mile warehouse district was steadily built around the mostly low-income Latinx community" (Creative, 2019). However, a set of processes is constantly being generated and circulated: the average income of ethnic minorities is low; gathered in remote communities and cheap land; factories and highways are established in the same communities; factories do not give sufficient local subsidies. The health of minority residents has been jeopardized, and their incomes are even lower. Therefore, it is not the minority that has chosen to live in a harsh environment, but the factories that produce pollution oppress the low-income minority.

### Average and Median Savings Levels by Income

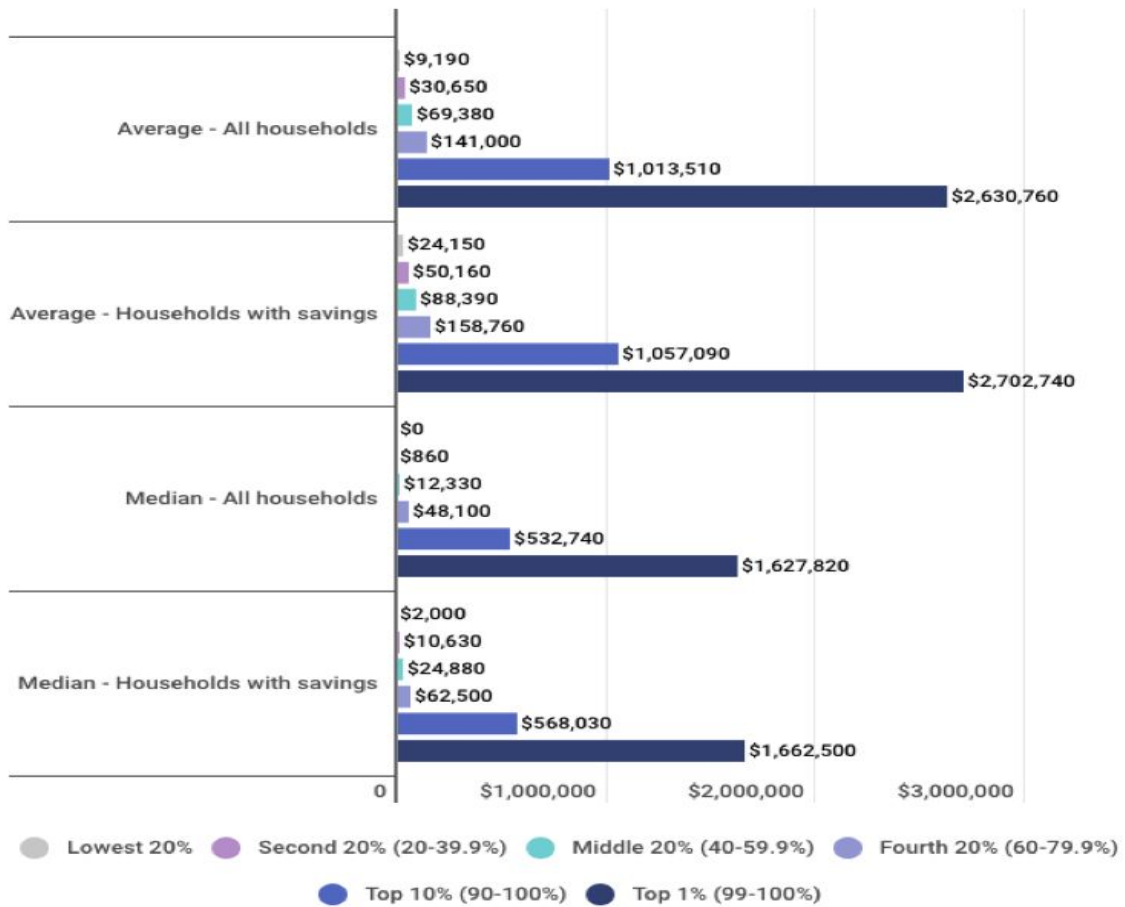


Fig.

20A

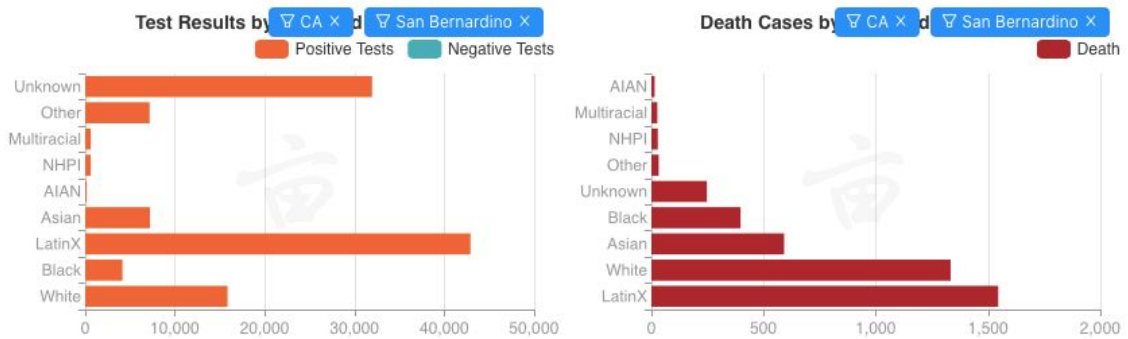


Fig. 20B



Fig. 20C

**Figure 20A.** Average and median savings by income percentile in San Bernardino County. Median households below the 20th percentile have zero dollars in savings. (Made by Federal Reserve, FDIC, and MagnifyMoney estimates June 2019, retrieved July 15, 2020).

**Figure 20B.** It can be seen that Latinos are the most injured race in terms of both the number of infections and the number of deaths. (Made by 1Point3Acres, July 16, 2020, retrieved July 16, 2020)

**Figure 20C.** People in San Bernardino County are fighting racial injustice, protesting for the Black Lives Matter movement. (Martine, Estacio, May 2019, retrieved July 15, 2020)

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# 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 STEEL WORKER CHECKING CONTENTS OF FURNACE TRADITIONALLY

Fig. 20 COLLAGE OF INJUSTICES

# APPENDIX

## Appendix 1: SKETCH: County Assets

### Eij County ASSETS SKETCH

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.

Asset	Data source	How is this a county asset?
County Climate Action Plans	(do a google search. Does your county have an action plan? Has it been recently updated?)	
environmental organizations		<p><b>Southern California Mountains Foundation</b> - support youth development through conservation initiatives integrating environmental education</p> <p><b>San Bernardino Valley Audubon Society</b> - strives to bring people to their natural environment. Focusing on birds and other wildlife</p>

		<b>Friends of Regional Parks of San Bernardino County</b> - utilizes grants, sponsorships, donations, and monies from fundraisers hosted throughout the year to support projects and programs at Regional Parks throughout San Bernardino County.
environmental education in K-12 schools		
community college programs that build skills supporting climate change mitigation or adaptation		<a href="#">San Bernardino Valley College</a> has an Environmental Science program that focuses on environmental issues that will have an impact on quality of life, business, and government. <a href="#">Crafton Hills College</a> offers an associate degree in Fire Technology as well as State Marshall Accredited Certification/Fire Fighting Technology. Students will learn about fire behavior, principles of emergency services, and building construction for fire prevention.
San Bernardino National Forest/ Mojave Desert		San Bernardino National Forest: 737,280 acres. Diverse outdoor activities with over 500 miles of hikeable trails. Ecologically diverse.
Solar Thermal Power Facilities	<a href="#">[Description]</a>	Mojave Solar Thermal Power Plant, Ivanpah Solar Power Facility (world's largest thermal power station)



## Appendix 2: SKETCH: Environmental Hazards

<b>EIJ COUNTY CLIMATE HAZARDS SKETCH</b>		
<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>		
<b>Hazard type</b>	<b>Data source</b>	<b>county data</b>
Wildfire	<a href="#">County Wide Plan</a>	San Bernardino County has had 10 Major wildfires between 1980 and 2016. Wildfires will further reduce already bad air quality, and put ash and soot in major waterways. There are 72 communities in San Bernardino County at risk of wildfires, which will increase with suburbanization.
extreme heat	<a href="#">CountyWire</a>	Temperatures exceed 100 degrees. The annual high temperature in 2018 is around 80°F, so this is a sign of extreme heat.
vehicle pollution (air pollution)	Healthy Places Index	19.2 kg of diesel particulate matter released per day in the county (avg). Same health damage as particulate matter.
ground-level ozone (air pollution)	<a href="#">AirNow</a>	Has an ozone quality index of 166, which is unhealthy
particulate matter (PM	Healthy Places Index	11.01 µg/m <sup>3</sup> of PM 2.5 per

2.5) (air pollution)	<a href="https://cpehn.org/chart/air-quality-fine-particulate-matter-san-bernardino-county-2007-2009">https://cpehn.org/chart/air-quality-fine-particulate-matter-san-bernardino-county-2007-2009</a>	year. Particulate matter causes endocrine disruption which affects hormone regulation in the body. It also causes cardiovascular and respiratory disease, birth issues, and premature death.
sea level rise	N/A	It is not near the coastal region
extreme weather/flooding	<a href="http://cms.sbcounty.gov/dpw/FloodControl.aspx">http://cms.sbcounty.gov/dpw/FloodControl.aspx</a>	The Flood Control functions are handled through the San Bernardino County Flood Control District under State legislation enacted in 1939. The District has developed a very extensive system of facilities, including dams, conservation basins, channels, and storm drains. The purpose of these facilities is to intercept and convey flood flows through and away from the major developed areas of the County.

### Appendix 3: SKETCH: Compound Vulnerabilities

<b>EIJ Intersecting Vulnerabilities Sketch</b>		
<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 <a href="#"><u>social determinants of health</u></a>. The items in the chart below are examples that you can build on (but you don't have to).</p>		
<b>county stressor</b>	<b>Data source</b>	<b>Evidence of county stress</b>
COVID-19 rates	<a href="#"><u>John Hopkins University CDC for National Average</u></a>	COVID rate compared to other counties? (It's lower) COVID-19 Rate: 0.898% National Rate: 1.0058%
Opportunity Index	<a href="#"><u>Opportunity Index</u></a>	Education Score (Important Aspects of Educational Success): 45.7 National Average: 55.2 California Average: 57.4  Community Score (Community Health and Civic Life): 36.4 National Average: 47.6 California Average: 46.4  Opportunity Score (Potential Opportunity): 47.8 National Average: 53.1

		<p>California: 56</p> <p>Economy Score (Economic Growth): 47.5 National Average: 55.4 California: 56</p>
School Absentee Data	<a href="#">EdSource</a>	<p>State Average: 11.1%</p> <p>San Bernardino City Unified School District: 16.7%</p> <p>Baker Valley Unified School District: 21.2%</p> <p>Needles Unified School District: 20.3%</p> <p>And many more districts with higher rates of absentees than the state average...</p>
Economic Distress	<a href="#">City-Data</a>	<p>67.4% Latino, median household income of \$60,420 (state average is \$71,805) 16.2% below poverty line</p>

## Appendix 4: SKETCH: Stakeholder Analysis

<b>Stakeholder Analysis Sketch</b>		
<p>In this sketch, list diverse environmental injustice stakeholders in your county in the center column. In the left column, list <b>catalysts</b> -- things (money, honorable reputation, etc) that <i>enable</i> this stakeholder group to get what they want. In the right column, list <b>corrosions</b> -- 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>		
<b>"catalysts"</b>	<b>stakeholders</b>	<b>"corrosions"</b>
Provide jobs and have improved unemployment rate	Amazon Warehouses	Organizations have successfully halt few of their operations
Protest for clean air	Local residents	Unable to stop large companies for producing pollution
Comes up plans for reduction emissions	South Coast AQMD	Unable to enforce law
Have strong lawsuit that sue large companies for pollution	EarthJustice	Do not have power over states
Has the authority to impose state laws	EPA	Doesn't pay full attention to local problems

Have powers over land of San Bernardino National Forest	United States Forest Service	Do not have power over transportation (vehicle pollution is the major problem in this county)
Have power to approve changes for San Bernardino County, including its general plan on climate change	San Bernardino County Board of Supervisors	Extra-local powers outrank them
Roots in the community and county; County is accountable to them	Rural Communities	Largely or feel largely ignored by extra-local powers
	National Weather Service	
Have the resources to fight fires and rescue civilians	San Bernardino County Fire Department / CalFire	Can do very little against a large wildfire inferno; Require reinforcement
Have a Fire Hazard Abatement program for reducing fuels on properties. Have somewhat significant enforcement powers	San Bernardino County Land Use Service	Operate on a typically complaint-based system
Have autonomy over operations of San Bernardino County's transportation systems	San Bernardino County Department of Transportation	Doesn't have control over business that may contribute a lot to bad air quality

Legislative and executive powers over the State of California.	California Assembly and Governor	Poor rapport at a local level
	Contractors and Unions	
	Homeowner's insurance companies	Do not want to do business in high risk wildfire areas

## Appendix 5: SKETCH: Stakeholder Actions

<b>Eij Stakeholder Action Sketch</b>		
<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>		
<b>Stakeholder</b>	<b>What actions have this stakeholder taken to address environmental injustice in this county?</b>	<b>What actions have this stakeholder NOT taken to address environmental injustice in this county? (Provide evidence)</b>
county department of transportation	<p>Promised Redlands-San Bernardino line that would operate with a <a href="#">zero emission train</a> powered by a hydrogen fuel cell</p> <p>(worth mentioning, as it stands, hydrogen fuel cells aren't actually zero-emission when taking into account how it's produced)</p>	<p>No other renewable energy transportation products of its kind are mentioned on the transportation website.</p>



<p>electricity companies</p>	<p>Mohave solar thermal facility. Energy sold to PG&amp;E <a href="#">source</a></p>	<p>Have not compensated damaged housing on related accidents</p>
<p>environmental organizations</p>	<p>Sued Fontana over massive warehouse complex; believed that they violated state environmental laws <a href="#">source</a></p>	
<p>San Bernardino County Board of Supervisors</p>	<p>Launched environmental stewardship in San Bernardino County as part of its general plan in 2007 <a href="#">[Policy]</a></p>	<p>Banned the development of renewable energy projects in San Bernardino County on private land, except for Community Oriented Renewable energy in 2019.</p>
<p>California Assembly and Governor</p>	<p>Passed and approved the law that would mandate renewable energy sources account for 50% by the very end of 2026 and 60% by the end of 2030. <a href="#">[Law/Bill]</a></p>	<p>Some California Lawmakers have protected companies like PG&amp;E <a href="#">[Governor]</a></p>

<p>San Bernardino Land Use Service</p>	<p><a href="#">Fire Hazard Abatement Program</a>. Offers tips on how to control vegetation around the home to reduce fire risk. Also have an enforcement policy included in their general program</p>	<p>Have not made this program more aggressive. Currently operates by complaint</p>
<p>United States Forestry Service</p>	<p><a href="#">Prohibited</a> campfires, smoking, and portable stoves.  <a href="#">Controlled burnings</a></p>	<p>Controlled Burnings cause smoke for inhabitants, but is necessary for the reduction of wildfires.</p>

## 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.

### ENVIRO-ORG: National Resource Defense Council

Url:

<https://www.nrdc.org/onearth/just-deserts>

<https://www.nrdc.org/resources/class-action-petition-writ-mandate-nrdc-vs-proposed-respondent-class-california>

<https://www.nrdc.org/experts/ed-osann/nrdc-files-class-action-suit-violating-water-saving-rule>

<https://www.nrdc.org/media/2011/111019>

<https://www.nrdc.org/experts/frances-beinecke/two-solar-projects-get-green-light-bring-clean-energy-and-jobs-california>

- YEAR: 2016 ARTICLE: Just Deserts

- **YEAR: 2019 ACTION: Class Action, Petition for Writ of Mandate: NRDC vs proposed respondent class in California**
- **YEAR: 2019 ACTION: 1,100 Reports Missing: NRDC Files Suit on Water-Saving Rules**
- **YEAR: 2011 ACTION: Groups Sue California Rail Yards Over Diesel Pollution**
- **YEAR: 2010 ARTICLE: Two Solar Projects Get the Green Light to Bring Clean Energy and Jobs to California**

**MEDIA: San Bernardino Sun**

**url:**

<https://www.sbsun.com/2020/01/30/critics-seek-courts-help-to-stop-eastgate-e-project-bound-for-san-bernardino-airport/>

<https://www.sbsun.com/2019/12/10/large-solar-project-east-of-barstow-wins-ok-from-san-bernardino-county-supervisors/>

<https://www.sbsun.com/2019/02/22/san-bernardino-county-board-of-supervisors-to-consider-guidelines-for-renewable-energy-development-in-the-desert/>

<https://www.sbsun.com/2018/02/13/how-chaffey-college-plans-to-cut-electricity-use-by-90-percent/>

<https://www.sbsun.com/2019/12/19/insurance-policies-on-inland-homes-affected-by-october-fires-get-one-year-protection/>

- **YEAR: 2020 ARTICLE: Critics seek court's help to stop Eastgate project bound for San Bernardino airport**
- **YEAR: 2019 ARTICLE: Large solar project east of Barstow wins OK from San Bernardino County supervisors**
- **YEAR: 2019 ARTICLE: San Bernardino County Board of Supervisors to consider guidelines for renewable energy development in the desert**

- **YEAR: 2018 ARTICLE: How Chaffey College plans to cut electricity use by 90 percent**
- **YEAR: 2019 ARTICLE: Insurance policies on Inland homes affected by October fires get one-year protection**

**MEDIA: Los Angeles Times**

**url:**

<https://www.latimes.com/business/la-fi-san-bernardino-solar-renewable-energy-20190228-story.html>

<https://www.latimes.com/environment/story/2020-01-22/california-needs-clean-energy-after-sundown-geothermal-could-be-the-answer>

<https://www.latimes.com/business/la-fi-san-bernardino-solar-wind-20190227-story.html>

<https://www.latimes.com/california/story/2019-10-27/fontana-california-warehouses-inland-empire-pollution>

<https://www.latimes.com/california/story/2019-10-31/homes-burning-in-san-bernardino-as-fire-sweeps-into-neighborhood>

**YEAR: 2019 ARTICLE: California's San Bernardino County slams the breaks on big solar projects**

- **YEAR: 2020 ARTICLE: California Needs Clean Energy after Sundown. Is the answer under our feet?**
- **YEAR: 2019 ARTICLE: California's biggest county could severely restrict solar energy projects**
- **YEAR: 2019 ARTICLE: When your house is surrounded by massive warehouses**
- **YEAR: 2019 ARTICLE: 'Fire! Fire!': Neighbors spread warning of encroaching Hillside fire in San Bernardino**

**ENVIRO-ORG: Sierra Club**

url:

[https://angeles.sierraclub.org/outings/news/blog/2006/03/rare\\_frogs\\_return\\_to\\_san\\_bernardino](https://angeles.sierraclub.org/outings/news/blog/2006/03/rare_frogs_return_to_san_bernardino)

<https://www.sierraclub.org/sierra/are-warehouses-inland-empire-blessing-or-curse>

<https://www.sierraclub.org/sierra/green-life/don-t-believe-hype-burned-forests-are-often-full-life>

<https://www.sierraclub.org/sierra/2016-1-january-february/green-life/story-behind-california-deserts-new-national-monuments>

- YEAR: 2006 ARTICLE: RARE FROGS RETURN TO SAN BERNARDINO
- YEAR: 2020 ARTICLE: Are Warehouses in the Inland Empire a Blessing or a Curse?
- YEAR: 2016 ARTICLE: Don't Believe the Hype: Burned Forests are Often Full of Life
- YEAR: 2016 ARTICLE: The Story Behind the California Desert's New National Monuments

**ENVIRO-ORG: Environmental Defense Fund**

url:

<https://www.edf.org/blog/2016/06/07/socal-braces-aliso-canyon-related-blackouts-these-energy-programs-can-help>

- YEAR: 2016 ARTICLE: As SoCal braces for Aliso Canyon-related blackouts, these energy programs can help

**ENVIRO-ORG: Center for Biological Diversity**

url:

[https://www.biologicaldiversity.org/species/mammals/San\\_Bernardino\\_flying\\_squirrel/natural\\_history.html](https://www.biologicaldiversity.org/species/mammals/San_Bernardino_flying_squirrel/natural_history.html)

[https://www.biologicaldiversity.org/campaigns/big\\_bear\\_lake\\_and\\_lake\\_arrowhead/index.html](https://www.biologicaldiversity.org/campaigns/big_bear_lake_and_lake_arrowhead/index.html)

[https://www.biologicaldiversity.org/news/press\\_releases/2018/RIX-facility-settlement-10-02-2018.php](https://www.biologicaldiversity.org/news/press_releases/2018/RIX-facility-settlement-10-02-2018.php)

[https://www.biologicaldiversity.org/news/press\\_releases/2016/san-bernardino-national-forest-11-17-2016.html](https://www.biologicaldiversity.org/news/press_releases/2016/san-bernardino-national-forest-11-17-2016.html)

[https://www.biologicaldiversity.org/news/press\\_releases/2008/san-bernardino-kangaroo-rat-10-17-2008.html](https://www.biologicaldiversity.org/news/press_releases/2008/san-bernardino-kangaroo-rat-10-17-2008.html)

- YEAR: n.d. ARTICLE: San Bernardino Flying Squirrel
- YEAR: n.d. ARTICLE: BIG BEAR LAKE AND LAKE ARROWHEAD: STOPPING RUNAWAY DEVELOPMENT IN THE SAN BERNARDINOS
- YEAR: 2018 ACTION: Agreement Reached to Protect Endangered Fish, Songbirds From San Bernardino Water Treatment Facility
- YEAR: 2016 ACTION: Appeal Challenges Nestlé's Unrestricted Water Siphoning From San Bernardino National Forest on Expired Permit During Historic Drought
- YEAR: 2008 ARTICLE: Endangered San Bernardino Kangaroo Rat Hops Closer to Extinction: Habitat Slashed by Feds

**ENVIRO-ORG: American Forests**

url:

<https://www.americanforests.org/blog/developing-a-climate-smart-restoration-plan-for-san-bernardino/>

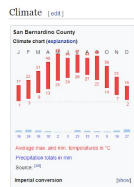
<https://www.americanforests.org/magazine/article/project-showcase-out-of-the-ashes/>

- **YEAR: 2019 ARTICLE or ACTION: Developing a Climate-Smart Restoration Plan for San Bernardino**
- **YEAR: 2019 ARTICLE: Project Showcase: Out of the Ashes**
- **YEAR: ARTICLE or ACTION:**
- **YEAR: ARTICLE or ACTION:**
- **YEAR: ARTICLE or ACTION:**

**Wikipedia:** San Bernardino County, California

**How are environmental problems mentioned (or not mentioned) in the county's Wikipedia article? .**

**Environmental quality** <sup>(edit)</sup>  
 California Attorney General Jerry Brown said the county in April 2007 under the state's *environmental quality* act for failing to account for the impact of global warming in the county's 25-year growth plan, approved in March. The Center for Biological Diversity, the Sierra Club and the Audubon Society also sued in a separate case. According to Brendan Cummings, a senior attorney for the plaintiffs, "San Bernardino has never seen a project it didn't like. They rubber-stamp development. It's very much of a frontier mentality." The plaintiffs want the county to rewrite its growth plan's environmental impact statement to include methods to measure greenhouse gases and take steps to reduce them.<sup>[1]</sup>  
 According to county spokesman David West, only 15% of the county is controlled by the county<sup>[2]</sup>(*within meaning*), the rest is cities and federal and state land. However, the county says it will make sure employment centers and housing are near transportation corridors to reduce traffic and do more to promote compact development and mass transit. The county budgeted \$205,000 to fight the lawsuit.<sup>[3]</sup>  
 The state and the county reached a settlement in August 2007.<sup>[4]</sup> The county agreed to amend its general plan to include a Greenhouse Gas Emissions Reduction Plan, including an emissions inventory and reduction targets.



San Bernardino County's wikipedia page does not mention specific environmental hazards or pollution. However, it does mention a lawsuit by California and environmental organizations for not including global warming as part of its 25-year general growth plan.

**Are environmental problems discussed on the talk page of your county's Wikipedia article? If yes, which issues do users discuss?**

- Contents** <sup>[hide]</sup>
- 1 Untitled
  - 2 We must stop the vandalizm on this board.
  - 3 Crime section is deleted, but not gang violence
  - 4 This article is just so wrong, and is a disgrace to the Wikipedia community
  - 5 Unbiased? (Thanks for reading.)
  - 6 Much better already. I'm impressed.
  - 7 We must stop the vandalizm on this board.
  - 8 Should we eliminate the Crime section?
  - 9 Repaired with NPOV
  - 10 Mountain time?
  - 11 Question on meaning...
  - 12 Alaska borough comparison
  - 13 Size
  - 14 Named for...
  - 15 citations
  - 16 Controversies
  - 17 county flag
  - 18 Alternate name - St Berdoo?
  - 19 Temecula inclusion
  - 20 Climate
  - 21 Bogus employment figures
  - 22 External links modified
  - 23 map?
  - 24 Cities in the San Bernardino Valley/Geography
  - 25 San Bernardino County, California redirect?

Contributors do not mention environmental issues in their discussions.



## Appendix 7: SKETCH: Possible Local Actions

### Eij LOCAL ACTIONS SKETCH

Use this sketch to chart out **problems** associated with climate change, **solutions** that have been proposed or implemented in other places, and possible ways 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 The State of California	Remove vegetation that meet a criteria for wildfire risk; limit the amount that

	<p>passed legislation <a href="#">preventing insurers from not renewing homeowners insurance policies with ZIP codes in or adjacent to a wildfire.</a></p> <p><a href="#">Government website</a> on how to protect property on wildfire risk. <a href="#">Additional info</a></p>	<p>can be removed to ensure strategic removals.</p> <p>Controlled burning</p>
No restrictions on where people can build homes.		<p>Notify potential and current homeowners about climate-change and wildfire risks associated with San Bernardino County.</p>
Renewable Energy Project Land-Use and Land Conservation	<p>Current solutions: Ban renewable energy projects in the county including private land; allow community oriented renewable energy (on-site; rooftop; shared primarily to locals).</p> <p><a href="#">See San Bernardino County Board of Supervisors Special Meeting</a></p>	<p>Additional/alternative solutions: Buy-out existing energy infrastructure and modify the existing structure or re-use land to produce energy with zero-greenhouse emissions.</p>
Wildfire residential outreach	<p>San Bernardino County Fire Department has several outreach programs for residents to protect their homes and quickly evacuate.</p> <p><a href="#">Facebook Post</a> <a href="#">Website</a></p>	
Arson (Accidental and	San Bernardino National	Create designated

premeditated)	Forest prohibits use of camp fires, cigars, and portable stoves in forest territory. <a href="#">[Link]</a>	firework launching areas, promising to not punish those launching <i>illegal</i> fireworks.  County newsletters and local television network advertising

**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.

<b>County: San Bernardino</b>		
<b>Identify a Problem</b>	<b>Identify ways this problem is being addressed through state, national and international initiatives.</b>	<b>Tailor these solutions to your county.</b>
CA (state) plans for energy transition (away from fossil fuels)	California plans to have 60% of its energy come from renewable sources by 2030, 100% by 2045	San Bernardino county banned “utility-oriented renewable energy”, and would instead prefer the energy to be directly used by the people living there. Thus one example of a step to be taken is the use of solar panels in homes that can (at state/national level, things like tax breaks for owning electric vehicles would also incentivise more people to make a switch).
Residents in high risk wildfire zones	Insurance companies are dropping or hiking rates for policies located in or adjacent to high wildfire risk areas. Coverage is offered by California through FAIR Plan  Assembly Bill 2367 ~ Requires insurance companies to write/renew insurance policies for homes that meet California's fire-hardening standard and to offer financial	Improve the FAIR Plan to offer better or priority coverage for wildfire risk areas.

	incentives for homeowners to make their homes more fire-safe. Etc.	
High amount of air pollution	California Ambient Air Quality Standards (CAAQS). Last updated in 2008. ( <a href="#">source</a> ). There is also the National Ambient Air Quality Standards (NAAQS).	Need to ensure that all standards are being locally met. Additionally, serious consideration for revision of standards could be necessary if no regulations have been breached.
No Restrictions on where to build homes		Would likely need to stop selling homes in high risk locations. Legislative action through California Assembly

## Appendix 9: SKETCH: Data & Qualitative Research Design Proposal

### Eij RESEARCH RECOMMENDATIONS SKETCH

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](#).

### RECOMMENDED QUANTITATIVE STUDIES

What kinds of pollution research are needed in this county?	An accurate model of the makeup of pollution content, their source and contribution to climate change based on a scientific big data statistical analysis.
What kinds of health research are needed in this county?	An accurate model of health trends and expected lifespan for the general population based on different possible scenarios of climate change response.
What kind of quantitative social survey data is needed in this county?	A general health survey on every resident should be performed to construct an accurate model for prediction based on quantitative data.

### RECOMMENDED QUALITATIVE STUDY

- What is your research question?

What is our most effective way to make the right decision against climate change based on data science and statistics?

- What social groups will you study and interact with?

Every individual within the country, including San Bernardino County, but San Bernardino County residents as initial deployment.

- How will you gain access to the social groups you'll focus on? What privacy protections will be needed?

A governmental involvement would be needed, a health survey should be performed along with such every scheduled census to construct a model. Since only health data are gathered, and imputed directly into the model without having ties to every individual, privacy will not be a concern.

- How could you use participant observation to answer your research question?

If enough data is observed, simulations can be performed by supercomputers scientifically to decide the best options we have to halt the progress of climate with minimal effect to individuals.

- How could you use in-depth interviewing to answer your research question? What questions would you ask?

A significant amount of deep interviewing would provide historical health data for the computer to construct a more accurate model for prediction. A description of historical health trends, along with a precise description of living conditions can be interviewed to gather the data needed for the modelling.

- How could you use focus groups to answer your research questions? What discussion prompts could you use?

If a small scale of prediction would be performed for testing prior to the actual modelling, A discussion on the past living condition of the area of research should be performed for as much accurate details as possible for the modelling to prove its capabilities.

- Who would find this research useful?

Scientists, Government officials, and Residents would all find this research useful because it offers an easy path to making useful decisions based on scientific simulations.

## Appendix 10: SKETCH: Multiple Forms of Injustice

<b>EIJ INTERSECTING INJUSTICES SKETCH</b>		
Use this sketch to chart out the many forms of injustice that intersect and compound to produce environmental injustice.		
<b>Type of environmental injustice</b>	<b>Example</b>	<b>Actions or research needed to respond to this type of environmental injustice.</b>
<b>DATA INJUSTICE:</b> Do stakeholders have the data they need to understand and respond to environmental hazards in this setting?	During the San Bernardino County Board of Supervisors special meeting, resident Sue Hammer claimed an environmental report by the County had purposefully inaccurate data. [ <a href="#">Meeting</a> see 1:36:42]	Require third-party media to intervene to expose intelligence.  Survey San Bernardino County residents about their trust of the local government. Why do they or do not trust the local government? What would make it more trustworthy? Etc.
<b>ECONOMIC INJUSTICE:</b> Does poverty or uneven wealth exacerbate environmental hazards in this setting?	Lower than average income live in communities with horrible ozone levels	Provide additional "disaster subsidies" to local poor residents, including prevention before disasters, free assistance in the event of disasters and proper resettlement after the disasters.
<b>EPISTEMIC INJUSTICE:</b> Are some ways of	Dangerous Ozone levels and P.M. 2.5 Levels have	



<p>understanding environmental hazards and harms discounted or silenced? Is environmental sense-making actively undermined?</p>	<p>not been addressed by the County of San Bernardino.</p>	
<p><b>GENDER INJUSTICE:</b> How do gender hierarchies shape both exposure to environmental hazards and capacity to address them?</p>	<p>(No Sex Ratios are the Same)</p>	<p>Considering that women's average income is lower than men's, this is a variant of "economic discrimination". In addition.</p>
<p><b>HEALTH INJUSTICE:</b> Are there health disparities or uneven access to health care in this setting?</p>	<p>More residents are uninsured for the first time in seven years <a href="#">[Source]</a></p>	
<p><b>INTERGENERATIONAL INJUSTICE:</b> Will future generations be impacted by action today that affect carbon emissions?</p>	<p>Yes. Most poor people choose community schools, which means they are likely to be exposed to pollution during school.</p>	
<p><b>MEDIA INJUSTICE:</b> Is there adequate news coverage of climate change and hazards in this county? Does news convey the perspectives and vulnerabilities of all stakeholders?</p>	<p>Not a lot of articles regarding climate change in San Bernardino county (The Sun was owned by Media News Group)</p>	
<p><b>PROCEDURAL INJUSTICE:</b> Have all stakeholders had fair access to government support and law to</p>	<p>The San Bernardino County Board of Supervisors meet on Tuesdays at 10:00 AM for regular meetings. Other</p>	<p>Create a proposition for changing the meeting time of the Board of Supervisors to 6 or 7 PM. This would make the decision accessible to</p>

<p>address climate hazards in this setting?</p>	<p>meeting times are between typical working times of 8:00 AM to 5 PM. <a href="#">[Meeting History]</a>. This prevents a significant amount of people from attending such as students and working people.</p>	<p>everyone in the County, not just those available at 10 AM.</p>
<p><b>RACIAL INJUSTICE:</b> Does climate change in this county disproportionately impact particular social groups, especially communities of color?</p>	<p>There is a disproportionate amount of hispanics in San Bernardino County. <a href="#">[Source]</a></p>	
<p><b>REPRODUCTIVE INJUSTICE:</b> Does climate change and environmental hazards in this setting undermine possibilities for safely parenting children?</p>		<p>Because the living environment of women during pregnancy will also determine the health of the next generation (the polluted environment may cause heavy metals and other harmful substances to accumulate in the uterus and fetus, causing deformities and genetic diseases).</p>
<p><b>OTHER FORMS OF INJUSTICE?</b></p>		

**Permission To Publish @ <https://disaster-sts-network.org>**

Do you consent to having your name listed as an author on the published case study?

<b>Name</b>	<b>Publish? (Y or N)</b>
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<b>Wonhee Lee</b>	<b>Y</b>
<b>Huiqi Mai</b>	<b>Y</b>
<b>Timothy Do</b>	<b>Y</b>
<b>Tahis Alcantar</b>	<b>Y</b>
<b>April Godinez</b>	<b>Y</b>
<b>Haoyang Liu</b>	<b>Y</b>
<b>Vince Marin</b>	<b>Y</b>
<b>Andrew Ramirez</b>	<b>Y</b>
<b>Depei Xu</b>	<b>Y</b>
<b>Jiaqi Wu</b>	<b>Y</b>