Sidney Sheets

POL 195

# Take My Breath Away: Disparities in Access to Parks and Environmental Quality

## Introduction

Environmental justice is the fair treatment of all individuals regardless of race, color, ethnicity, or other respected characteristic, in regard to the implementation and enforcement of environmental policy. Research across various academic fields has reached broad consensus over the following: 1) Minority and low-income communities disproportionately face environmental harms and hazards. 2) With climate change accelerating the severity of environmental hazards, this impact will only get worse, and irreversible harm will hit these disadvantaged communities the hardest.

With widespread action slow to the uptake, now local jurisdictions are looking for solutions to remedy the inequity within their own cities. One possible solution is to preserve and rehabilitate existing green spaces. To explore this solution, I've decided to look at the existing impact of green spaces in California. My main research question is, How does park access within ½ mile of residency impact environmental outcomes? Using park access data and CalEnviroScreen 3.0 ratings, I hypothesize that increased access to parks near residency will improve environmental ratings. By testing this hypothesis, I hope to see whether or not increasing park development and preservation would be an effective step toward bettering environmental outcomes.

## Past Research On Environmental Inequity

Clean air is in high demand but in dwindling quality with urban development and industrialization. Air pollution rates and traffic density have been linked to increased asthma hospitalizations, increased risk of heart disease, certain forms of cancer, and decreased birth weights and head circumference in newborns. Because of these negative health impacts, the EPA has declared fine particle pollution as a serious health risk. CITE EPA While pollution is an issue that impacts all people, studies show that minorities and low-income communities are disproportionately impacted by higher rates of pollution and negative health impacts.

Racist historical practices have created an ongoing cycle that places minority communities on the blunt receiving end of poor environmental quality and health risks. A New York Times article reported that urban neighborhoods redlined in the 1930s are now found to have higher levels of pollution.[1] Neighborhoods rated "hazardous" investments in the 1930s were predominately minority communities. Eight decades later, siting for freeways and industrial activities are disproportionately located near these redlined neighborhoods, and the communities continue to face the brunt of this. These neighborhoods are found to have less green space and tree canopy. Green space is attributed to the absorption of pollutants and carbon dioxide emissions, which can improve air quality.[2] Poor air quality has been linked to increased rates of asthma, which is evident in redlined communities, as a 2019 study found asthma-related hospital visits to be twice as likely in a redlined community. Tree canopy is important not only for its ability to improve air quality but also to decrease high temperatures. The New York Times

1 Popovich, Nadja. 2022. "How Redlining Contributed to Air Pollution Across America." The New York Times. https://www.nytimes.com/2022/03/09/climate/redlining-racism-air-pollution.html.
2 Schottland, Taj. 2019. "Parks as a Solution to Climate Change | Health & Wellness | Parks and Recreation Magazine | NRPA." National Recreation and Park Association. https://www.nrpa.org/parks-recreation-magazine/2019/april/parks-as-a-solution-to-climate-change/.

reported that redlined neighborhoods were found to be 5 degrees hotter in the summer than other areas on average.[3]

In regards to ongoing political processes that harm environmental quality for low-income and minority groups, Liam Downey's article "Environmental Inequality in Metropolitan America in 2000," describes that in the environmental inequality field, there are two categories: inequitable environmental outcomes and intentional racism. Downey argues inequitable environmental outcomes often occur because of the existing disparate social impacts that cause members of specific social groups to be more likely to move into environmentally hazardous neighborhoods.[4] With upper and middle-income individuals being predominantly white, they have the upper hand when it comes to buying and renting in more desirable, more expensive places to live.

On the other hand intentional racism within the environmental policy, occurs when businesses intentionally place hazardous industrial facilities near minority neighborhoods. In a 2001 study, researchers tested whether treatment, storage, and disposal facilities (TSDFSs), attracted minorities or whether minorities attracted TSDFs, and found that there was no evidence that suggested minorities were more likely to move into a neighborhood with a TSDF. Instead, the study found that siting for TSDFs was found to be located more often near already existing minority communities.[5] Reconciling these two theories, evidence highly suggests it is not one or the other but a mixture of both social disparities and an intentionally racist placing of these sites.

3 (Popovich 2022)
4 Downey, Liam. 2006. "Environmental Inequality in Metropolitan America in 200." National Institutes of Health.
5 Pastor, Manuel, Jim Sadd, and John Hipp. 2001. "Which Came First? Toxic Facilities, Minority Move-In, And Environmental Justice." Journal of Urban Affairs 23 (1): 1-21.

In a 2004 study, researchers compared Toxic Air Release Facilities (TRAFs) to residential income, race, employment, population density, and home ownership. This study confirmed past research which found minority and low-income communities are excessively near TRAF, however fairly asserted income may be a problematic variable because it crosses into both the economic and political realms. Instead, they found homeownership to be a more direct measurement related to TRAF placement.[6] This is especially consistent with the zoning and general plan processes in place. When re-zoning occurs, there are several venues and opportunities for community participation and political involvement. Those who own homes are more likely to be not only closer to their community but also more likely to mobilize and resist the placement of industrial or toxic sites. Homeownership rates also indirectly capture the variable of income because those middle to high-income are more likely to be the owner of a home. Furthermore, not only are low-income communities less likely to in community organizing, they may have less power and ability to resist siting for these TRAFs, making them easy prey for dangerous, environmental hazards.

**Relevant Policy**

Attempts to remedy environmental hazards began roughly in the early 1970s, with both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) in 1970. NEPA requires federal agencies to evaluate and assess the impact a federal project will have on the environment. Similarly, CEQA requires that both the California public and government officials are made aware of the environmental impacts a project will have, allowing time for public intervention or comment. Unfortunately, there is much debate over

6 Pastor, James L. Sodd, and Manuel Morello-Frosch. 2004. “Waiting to Inhale: the Demographics of Toxic Air Release Facilities in 21st Century California.” Social Science Quarterly 85, no. 2 (June).

whether or not these acts have been successful. Environmentalists have argued that many projects with detrimental impacts have remained uncontested while NIMBY-ist groups have unfairly used the act to target affordable housing projects. As of now, environmentalists have reached somewhat of a conclusion agreeing there needs to be stricter restrictions placed on commercial projects.[7]

SB 535, passed in 2012, is another important piece of legislation that established minimum spending requirements from CAP-and-Trade funds toward disadvantaged communities; regions in which Californians are excessively burdened by economic, health, and environmental hazards. SB 350, passed in 2016, expands upon SB 545 further, creating the Disadvantaged Communities Advisory Group which reviews programs and policies meant to combat pollution in these impacted regions.[8]

Another piece of legislation that passed in 2016 is SB 1000 which requires local governments to add an environmental justice element to their general plans, with programs and policies directed toward helping disadvantaged communities.[9] While the implementation seems to be off to a slow start, with many localities still revising their plans, this bill has the potential to have a major impact on the fight for environmental justice. This bill has at least spurred local governments to recognize the regional disparities that exist and to develop and implement goals and policies that work to remedy these disparities. With these policy successes, we now face the

7 Bland, Alastair. 2019. “Weakling or bully? The battle over CEQA, the state's iconic environmental law.” CalMatters. https://calmatters.org/economy/2019/05/weakling-or-bully-ceqa-environmental-law-california-development-battles/.

8 “SB 535 Disadvantaged Communities | OEHHA.” n.d. OEHHA. Accessed July 30, 2023. https://oehha.ca.gov/calenviroscreen/sb535.

9 “SB 1000 - Environmental Justice in Local Land Use Planning.” n.d. California Department of Justice. Accessed July 30, 2023. https://oag.ca.gov/environment/sb1000.

difficulties of trying to find effective strategies that mitigate existing disparities and improve environmental quality for all.

**Why Parks?**

Park access is known to have a multitude of positive health, social, and economic impacts. In a study posted by the Urban Institute, studies in Texas have linked living in areas with higher densities of trees were linked to lower rates of obesity and an overall better health-related quality of life. Urban Institute also reported parks and green space are linked to positive impacts on mental health. Additional studies have found a positive relationship between green spaces and tree coverage and a decrease in the use of mental health services and treatments. Parks can lower levels of depression and decrease social isolation by creating a shared space for community members to interact.[10]

I have chosen to look at parks and green spaces in specific to better understand their impact in California. As green spaces and vegetation are widely recognized to have a positive impact on the environment by improving air quality and reducing levels of pollution, I would like to evaluate whether or not park development would be successful in improving California's environmental quality.

**Theory and Argument**

In order to investigate whether policies that incentivize park development will be an effective measure in mitigating environmental pollution, I will be using the California Protected Areas Database's "Park access within ½ mile of residency," and CalEnviroScreen ratings. I hypothesize that increased resident access to parks will lead to better environmental outcomes.

10 Cohen, Mychal, Kimberly Burrowes, and Peace Gwam. 2022. "The Health Benefits of Parks and their Economic Impacts." Urban Institute. https://www.urban.org/sites/default/files/2022-03/the-health-benefits-of-parks-and-their-economic-impacts_0.pdf.

Vegetation, like trees, often in parks, has the ability to not only produce oxygen but also reduce and filter pollutants from the air.[11] This makes the air we breathe both cleaner and healthier, as pollutants like particulate matter (PM) have been linked to numerous health defects.

A possible issue with this theory is that I am assuming foliage and trees are synonymous with parks. In reality the size of a park, its quality, and most importantly for these purposes, its vegetation can all differ. With respect to parks as a development strategy to help disadvantaged communities, "park access" can not capture any inequities in the park quality itself, but can only reflect inequities in whether or not certain groups have less access than others to these parks. Studies have shown that redlined neighborhoods have fewer parks and trees. This not only makes these neighborhoods subject to poorer environmental quality but is also known to make these neighborhoods significantly hotter in temperature.[12] Some studies have shown that parks in lower-income neighborhoods may have an increased population density with poorly maintained facilities and fewer services than those in higher-income neighborhoods.[13]

In addition to the quality of parks, the placement and the surrounding environment of a park is important in providing key information about how necessary its presence may be. Rural areas are known to have better air quality than urban areas because there is a smaller population, less industrial siting, and hence fewer pollutant emissions. Because of this overall better environmental outlook for these communities, parks may not only be less needed but also less

11 Stancil, Joanna M. 2015. "The Power of One Tree - The Very Air We Breathe." USDA. https://www.usda.gov/media/blog/2015/03/17/power-one-tree-very-air-we-breathe.
12 Merrill, Andrea. 2021. "The Importance of Parks and Trees in Urban Areas." Animals of the Pacific Northwest. https://animalsofpnw.com/2021/08/24/the-importance-of-parks-and-trees-in-urban-areas/.
13 ("Neighborhood Income Matters: Disparities in Community Recreation Facilities, Amenities, and Programs", n.d.)

successful in driving down any pollutants that do exist; or rather we may be less able to test the success without other environmental factors conflating the relationship.

With respect to the geographical and topographical features of California, certain areas are disproportionately impacted by pollutants. The central valley is trapped between a coastline and a mountain range, making pollutants group together disproportionately. It's quite likely that environmental quality will be most impacted by such geography and pollutant pooling than anything else. Theoretically speaking, but because of these limitations, my study may not completely be indicative of the direct impact a park can have. Park development may not be a "one size fits all" strategy across California, however, as this study may prove a strategy more successful in certain areas despite or because of these environmental variables.

**DATA**

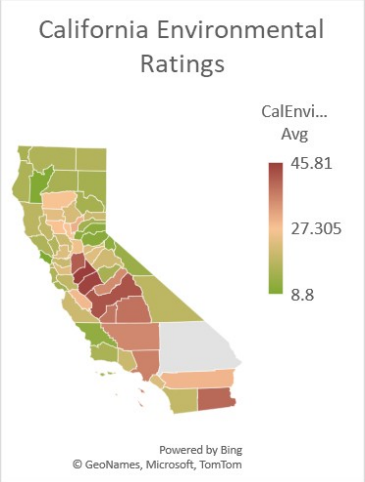
To test this hypothesis the California Protected Areas Database's "Park access within ½ mile of residency" (2016), serves as my independent variable.[14] This database classifies a park as any park or open space land in California. This means the definition of a "park" can vary from a small neighborhood park to a national park, like Yosemite. It captures the percentage of residents located within ½ mile of a park, which I will be measuring at the county level. As mentioned previously, this measurement is limited by its inability to not capture the density of its usage, quality, or surrounding environment. Importantly it can reflect the inequities of the access itself, as well as the direct impact proximity and number of parks, have on environmental quality.

Figure 1: California Average Park Access within ½ mile of residency using CPAD 2016 Database

14 CA.GOV California Open Data Portal. 2016 Park, Beach, Open Space, or Coastline Access. 2017. data.ca.gov, https://data.chhs.ca.gov/dataset/ff3083ea-17cb-4fb2-b51e-183444515b67/resource/505264b7-8a69-40f8-91fa-459bb386c46e/download/hci_accesstoparks_469_ca_re_co_cd_pl_ct-7-3-2017-ada.xlsx.


My dependent variable is CalEnviroScreen 3.0 (2018) which uses "environmental, health, and socioeconomic information" to scale environmental scores.[15] These scores range from 0-100, 100 indicating the worst environmental quality possible in the index. This measurement was created under SB 535 and has primarily been used as a tool for local governments to identify the disadvantaged communities that exist within their neighborhoods.

Figure 2: CalEnviroScreen Average county ratings




Using county-level park access and the CalEnviroScreen data as my main variables, I will be conducting a regression analysis, while also choosing to control for poverty and rurality levels

15 CalEnviroScreen 3.0 Results - Datasets - California Open Data." 2019. California Open Data. https://data.ca.gov/dataset/calenviroscreen-3-0-results.

due to the impact they likely have. My poverty measurement is from the U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE) 2016 program.[16] Poverty is measured by the county rate of residents living in poverty. To measure rurality, I have selected data from the United States Census Bureau, County Rurality Level which uses 2010 census data, measuring the percentage of the county population living in a rural area. Counties with less than 50% of the population living in rural areas are classified as mostly urban. Counties with 50 to 99.9% are classified as mostly rural, and counties with 100% are classified as completely rural.

**Research Methodology**

Before starting my regression analysis, I wanted to better understand the relationship between variables and the interactions they may have with each other, outside of park access' impact on environmental scores. From my understanding of past research, I wanted to first see how poverty rates impacted the accessibility of parks. As seen in Figure 3, as poverty levels increased, park access decreased. This finding correlates with past research that indicated lower-income areas had less access to parks. On top of the relationship between poverty and park accessibility, I also wanted to find the direct relationship poverty had on environmental outcomes. Figure 4 backs up past research that suggested lower-income areas had worse environmental quality. In California, counties with higher rates of poverty and poorer environmental ratings than those with lower rates of poverty.

Figure 3: Park Access by Poverty

16 (Semega, Jessica L., Kayla R. Fontenot, and Melissa A. Kollar. 2017. "Income and Poverty in the United States: 2016." U.S. Census Bureau. https://www.census.gov/library/publications/2017/demo/p60-259.html.

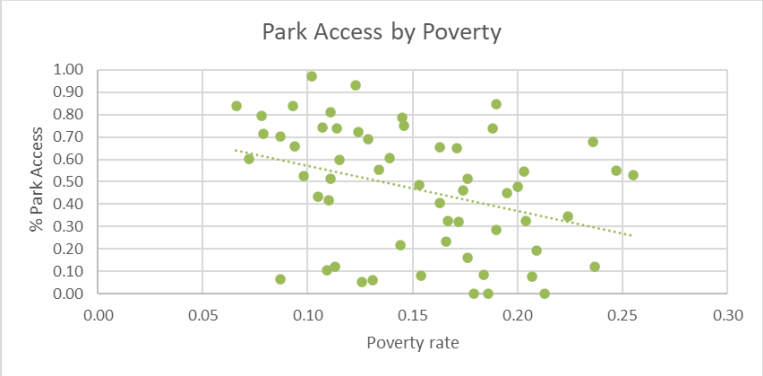
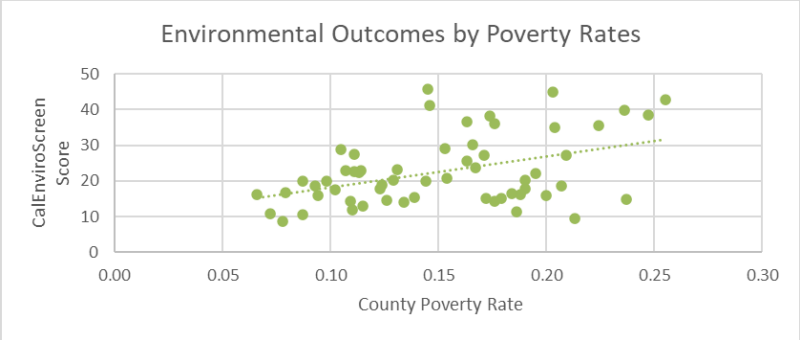



Figure 4: Environmental Outcomes by Poverty

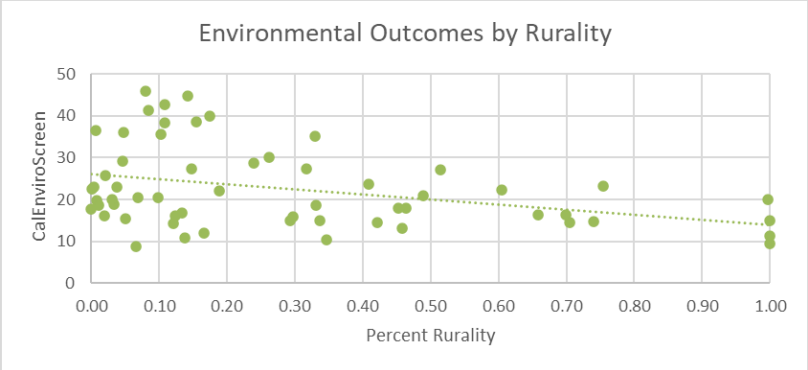



A small disclaimer: Figures using the CalEnviroScreen as their dependent variable may seem misleading, as some assume an upward trend to mean an improvement in environmental quality. However, the CalEnviroScreen's 1-100 scale marks 100 as the worst environmental quality, making any upward trend a worsening of environmental quality and a downward trend an improvement.

Finally, I also wanted to evaluate the relationship between rurality and environmental ratings. Because past research has found rural areas have less pollution and more foliage to mitigate the existing pollution, I expected rural areas to have better environmental ratings. Figure 5 showcases exactly this, as the percentage of residents living within a rural area of a county

goes up, environmental quality ratings improve. As seen in figures 3-5, there is quite a bit of interaction occurring between these variables, backing up my need to control for these in my main regression analysis.

Figure 5: Environmental Outcomes by Rurality




**Multivariate Regression Results**

| ***Regression Statistics*** | |
|---|---|
| **Multiple R** | **0.602687507** |
| **R Square** | **0.363232231** |
| **Adjusted R Square** | **0.327856244** |
| **Standard Error** | **7.997691727** |
| **Observations** | **58** |

| | **Coefficients** | **Standard Error** |
|---|---|---|
| Intercept | 7.375109192 | 5.884055241 |
| Percent Rurality | -0.11638295 | 0.053879011 |
| Poverty Rate | 113.8365898 | 23.38341315 |
| Park Access | 3.589962978 | 5.830890472 |

**Regression Analysis**

My complete regression analysis found an adjusted r-squared value of .328, meaning that 32.8% of the variability within my data (n=58) can be explained by my regression model. Out of all of my independent variables, park access had no statistically significant interaction with environmental ratings, disproving my hypothesis. Instead, rurality and poverty both had statistically significant results. My rurality variable had a coefficient value of -0.116, with a standard error of 0.054. This indicates that as I suspected, a higher percentage of rurality drove down environmental ratings. Most statistically significant was my poverty rate variable, with a coefficient of 113.84 and a standard error of 23.83. So overall my regression model found that while poverty and rurality levels had significant impacts on environmental ratings, park access did not.

Because of the interaction between my variables, I decided to take my research an additional step forward and categorically separate by poverty and rurality levels. Separating by urban, suburban, and rural I conducted a correlation test to see the separate r values and relationship between parks and environmental outcomes in different environmental contexts. Interestingly I found quite different relationships between the three. Due to the size limitations of my dataset, these findings were insignificant but perhaps may be indicative of a possible relationship that should be further studied. Within the rural subset, I found a correlation coefficient of .302, indicating a low positive correlation meaning that as rurality increases, CalEnviroScreen scores go up. As higher scores indicate worse environmental outcomes, this would disprove my hypothesis and suggest that in rural areas park development could potentially worsen environmental quality. My suburban subset had a correlation coefficient of .009, indicating basically no relationship between park access and environmental outcomes.

The strongest relationship found within these subsets was my urban data, with a correlation coefficient of -0.469. This coefficient indicates a moderate negative relationship meaning that "urban" parks drive down poor environmental ratings. Based on this coefficient, my hypothesis that parks improve environmental quality could be true in regard to urban parks in particular. This finding makes sense in regard to what this dataset considers a "park." Urban areas have fewer farmlands or private properties with high acreage of undeveloped land that is not considered to be a "park." These areas are likely to have the same environmental impacts as a park without being classified or available for use as a park itself, making it more difficult to test the relationship between actual parks and environmental outcomes. Since urban areas don't have such spaces, we can better see this relationship without it being drowned out by such environmental factors we were unable to control. Additionally, since urban spaces also have more pollution to be absorbed, we may see a higher impact than rural areas with less overall pollution.

My finding that rural parks actually worsened environmental outcomes is more surprising, because with the above logic I would assume to find either a weak or no relationship at all. I speculate this finding may be attributed to the uses of these rural lands outside of parks, such as areas with high traffic or proximity to freeway and industrial presences.

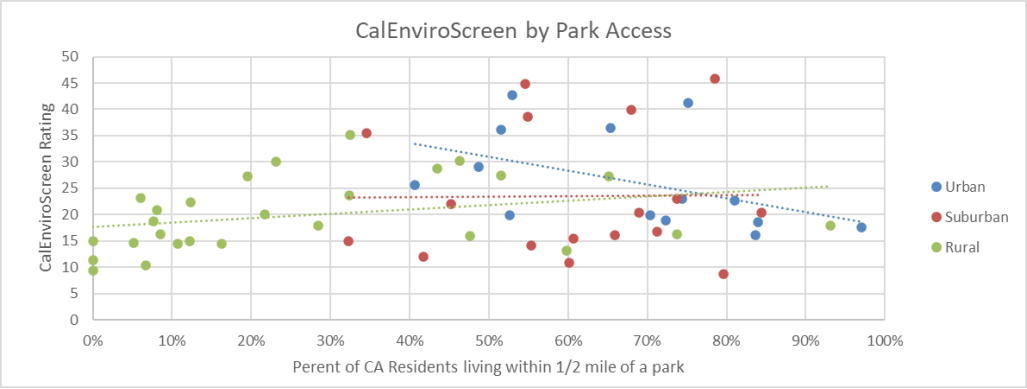


**Figure 6: Park Access and Environmental Outcomes by Rurality**

**Separation by Rurality**

| | Correlation Coefficient |
|---|---|
| Urban | -0.469325234 |
| Suburban | 0.009016098 |
| Rural | 0.302042798 |

**Table 3: Rurality Correlation Coefficients**

To separate by poverty levels, I categorically divided by low, moderate, and high rurality levels to measure the separate impacts parks have within income variation. My low poverty subset had a correlation coefficient of -0.017 indicating basically no relationship between parks and environmental quality. The moderate poverty subset had a correlation coefficient of 0.395, indicating a moderate relationship between park access and environmental outcomes, suggesting that in areas with moderate poverty, park access degraded environmental quality. The high-poverty subset, with a correlation coefficient of 0.936, suggested a very strong relationship between park access and environmental scores; high-poverty area parks degraded environmental quality.

While I can't be sure, I would suggest there is something else happening than parks truly worsening environmental quality in high-poverty areas. From past research on siting, brownfields, and industrial proximity, I would suggest it's less about the parks themselves and more so about what they are located near. The counties in my high-poverty subset were: Del Norte, Fresno, Imperial, Kern, Lake, Tehama, Trinity, and Tulare. A majority of these are located within the Central Valley, which as mentioned earlier is infamous for its poor air quality due to the topographical nature of California.

The findings within the poverty subset suggest that average income may have been a better measurement to reflect how community wealth is distributed in regard to public amenities. While poverty allowed me to see the lack of park success in poor communities, I was not able to see the full scope. Perhaps if I used income and divided it from extremely low, low, moderate, and high-income I would have seen that while parks were associated with poorer environmental outcomes in lower-income areas, parks in higher-income areas may be associated with better environmental outcomes. Of course, this is only hypothetical, and the findings I do have do not serve as adequate evidence for this. Again, however, there is the danger of the fact that lower-income neighborhoods are known to be impacted by poor environmental quality, regardless of parks, because of excessive factors I was unable to control.

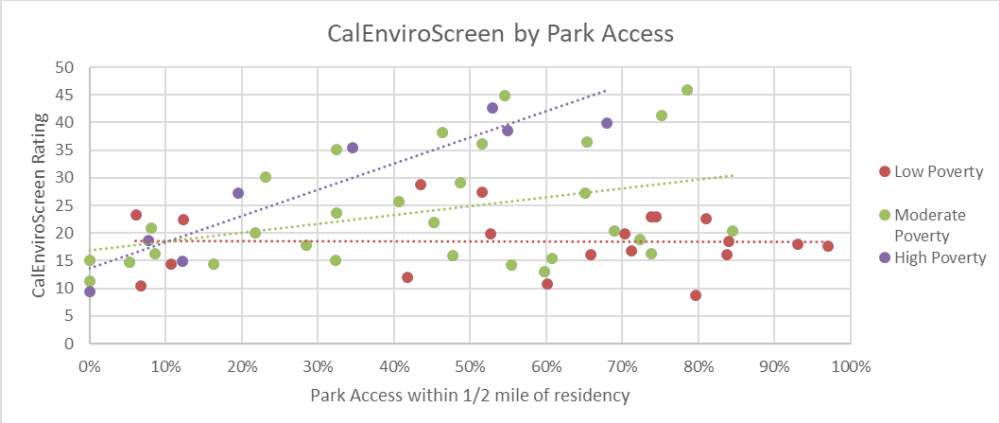



Figure 7: Park Access and Environmental Outcomes by Poverty Levels

## Separation by Poverty

| | Correlation Coefficient |
|---|---|
| Low Poverty | -0.017106997 |
| Medium Poverty | 0.394776217 |

| | |
|---|---|
| High Poverty | 0.93557622 |

Table 4: Poverty Correlation Coefficients

**Conclusion, Further Research, and Policy Implications**

In summary, my county-level regression model found no statistically significant relationship between park access and environmental outcomes. However, I did find a statistically significant relationship between rurality and environmental outcomes that suggested increased rurality was associated with better environmental ratings. I also found a strong statistically significant relationship between poverty and environmental outcomes that suggest increased rates of poverty are associated with worse environmental ratings, which is in agreement with past research. The safest conclusion I can come to from this study is that a more in-depth analysis of park access and environmental ratings is needed.

From these findings, I suggest research geared toward evaluating the impact of urban parks specifically. Many studies have been done evaluating the cooling effect of green spaces on urban heat islands, one in Baltimore, Maryland, and Washington, D.C. found parks could be as much as 17 degrees cooler than parts of the city without trees and green space.[17] More studies should be conducted in a similar fashion that evaluates the differences in air quality within city regions, comparing areas with increased access to those with less.

Furthermore, I think a time-study analysis would be the best way to directly measure the success of a park, or at least new parks. Evaluating environmental ratings within an area before, during, and after its development would allow us to see how a park's success varies within different contexts in regard to its surrounding environment. Unfortunately, there are quite a few

limitations to this study. It would be quite cost and time-prohibitive. Additionally, for it to be replicable, the study would need to be done multiple times in varying locations.

**So, Is park development an effective policy program?**

The short answer is my study is truly only indicative of a need for future research, as well as backing up past research that evaluates environmental injustice patterns. A severe limitation of this study was that I utilized county averages, rather than a more in-depth measure of census tract or zip code data. Using county averages completely glosses over inequities occurring from neighborhood to neighborhood, inequities which can be attributed to historical redlining and ongoing discriminatory siting practices. As local governments have been tasked with helping disadvantaged communities under SB 535, SB 350, and SB 100, they should evaluate whether or not green infrastructure is a successful strategy for their own communities.

My data and prior research support the theory that park development programs may be more successful in urban areas than in rural. Additionally, while green infrastructure may be not only more successful in urban areas, research suggests tree growth differs quite a bit from rural to urban areas. Studies have found that in urban areas, trees not only grow faster but are also able to engage in higher rates of carbon cycling. On the other hand, trees in urban areas also die faster.[18] This means that any program utilizing green infrastructure as an environmental justice strategy should not only encourage development, but also the preservation of existing trees and green spaces. The upkeep of green infrastructure is just as important as the initial development steps.

To conclude, I would also like to assert that inaccess to park amenities is an injustice in itself. In the initial stages of my research, I found that increased rates of poverty were associated

with less access to parks, see Figure 3. Research outside of environmental justice such as in the fields of public health, social well-being, and economic impacts have found parks to have numerous positive effects. The environment and green spaces are a form of public good that under the framework of environmental justice should be equitably available for all residents, regardless of race or income.

References

"Benefits of Green Infrastructure | US EPA." n.d. EPA. Accessed August 21, 2023. https://www.epa.gov/green-infrastructure/benefits-green-infrastructure.

Bland, Alastair. 2019. "Weakling or bully? The battle over CEQA, the state's iconic environmental law." CalMatters. https://calmatters.org/economy/2019/05/weakling-or-bully-ceqa-environmental-law-california-development-battles/.

"CalEnviroScreen 3.0 Results - Datasets - California Open Data." 2019. California Open Data. https://data.ca.gov/dataset/calenviroscreen-3-0-results.

Cohen, Mychal, Kimberly Burrowes, and Peace Gwam. 2022. "The Health Benefits of Parks and their Economic Impacts." Urban Institute. https://www.urban.org/sites/default/files/2022-03/the-health-benefits-of-parks-and-their-economic-impacts_0.pdf.

Downey, Liam. 2006. "Environmental Inequality in Metropolitan America in 200." *National Institutes of Health*.

Mabahwhi, Bte, Nurul Ashikin, Oliver L. Hoon Leh, and Dasimah Omar. 2014. "Human Health and Wellbeing: Human health effect of air pollution." *Procedia Social and Behavioral Sciences*, (January).

McKenzie, Thomas L., Jamie S. Moody, Jordan A. Carlson, Nanette V. Lopex, and John P. Elder. 2022. "The Health Benefits of Parks and their Economic Impacts." Urban Institute. https://www.urban.org/sites/default/files/2022-03/the-health-benefits-of-parks-and-their-economic-impacts_0.pdf.

Merrill, Andrea. 2021. “The Importance of Parks and Trees in Urban Areas.” Animals of the Pacific Northwest. https://animalsofpnw.com/2021/08/24/the-importance-of-parks-and-trees-in-urban-areas/.

“Neighborhood Income Matters: Disparities in Community Recreation Facilities, Amenities, and Programs.” n.d. NCBI. Accessed August 21, 2023. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4082954/.

Pastor, Manuel, Jim Sadd, and John Hipp. 2001. “Which Came First? Toxic Facilities, Minority Move-In, And Environmental Justice.” *Journal of Urban Affairs* 23 (1): 1-21.

Pastor, James L. Sodd, and Manuel Morello-Frosch. 2004. “Waiting to Inhale: the Demographics of Toxic Air Release Facilities in 21st Century California.” *Social Science Quarterly* 85, no. 2 (June).

Phillips, Carly. 2022. “Climate Change Threatens Already Poor Air Quality in California's Central Valley.” UCS blog. https://blog.ucsusa.org/carly-phillips/climate-change-threatens-already-poor-air-quality-in-californias-central-valley/.

Popovich, Nadja. 2022. “How Redlining Contributed to Air Pollution Across America.” The New York Times. https://www.nytimes.com/2022/03/09/climate/redlining-racism-air-pollution.html.

“Research on Health Effects from Air Pollution | US EPA.” 2023. EPA. https://www.epa.gov/air-research/research-health-effects-air-pollution.

“Research on Health Effects from Air Pollution | US EPA.” 2023. EPA. https://www.epa.gov/air-research/research-health-effects-air-pollution.

"SB 1000 - Environmental Justice in Local Land Use Planning." n.d. California Department of Justice. Accessed August 21, 2023. https://oag.ca.gov/environment/sb1000.

"SB 535 Disadvantaged Communities | OEHHA." n.d. OEHHA. Accessed August 21, 2023. https://oehha.ca.gov/calenviroscreen/sb535.

Schottland, Taj. 2019. "Parks as a Solution to Climate Change | Health & Wellness | Parks and Recreation Magazine | NRPA." National Recreation and Park Association. https://www.nrpa.org/parks-recreation-magazine/2019/april/parks-as-a-solution-to-climate-change/.

Semega, Jessica L., Kayla R. Fontenot, and Melissa A. Kollar. 2017. "Income and Poverty in the United States: 2016." U.S. Census Bureau. https://www.census.gov/library/publications/2017/demo/p60-259.html.

Stancil, Joanna M. 2015. "The Power of One Tree - The Very Air We Breathe." USDA. https://www.usda.gov/media/blog/2015/03/17/power-one-tree-very-air-we-breathe.