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Mapping Land Use Around the San Francisco Bay: A Look at Environmental Justice through S. F. Bay Conservation and Development Commission's Permitting History

Pitzer College Environmental Analysis
Senior Thesis Fall 2018
By Aviva Wolf-Jacobs

Special thanks to:

- Guillermo Douglass-Jaimes
- Susan Phillips
- Shannon Fiala, Clesi Bennet, and the entire BCDC staff

Table of Contents

I. Abstract

Planning and regulatory environmental agency San Francisco Bay Conservation and Development Commission (BCDC) plays an important role in the permitting of development around the San Francisco Bay. As the agency works to add an environmental justice amendment to its primary policy document, this research explores the S.F. Bay Area's history of approved development project proposal permits, and the associated patterns of land use and environmental justice implications in order to support the proposed change in permitting policy. By classifying all major permits found within BCDC's internal permit database into groups based on the type of land use associated with the permit project, i.e. Industrial, Flood Control, Ports, etc., it was possible to create maps showing the geographic distribution of each group of permits. To analyze potential environmental justice implications of the patterns of geographic distribution of development permits, each group of permit types was layered on top of spatial data representing areas around the SF Bay that have been identified as highly socially vulnerable. Based on the findings of this project, it appears that highly socially vulnerable communities around the San Francisco Bay bear a disproportionate amount of land-use related environmental burdens. Furthermore, it is crucial to recognize the limitations of geospatial analysis tools in conveying the magnitude of disproportionate environmental and community health impacts of land use on socially vulnerable communities in the San Francisco Bay Area.

II. Introduction

My nose crinkled up as I drove over the San Francisco Bay Bridge, just as it always does during that particular five-minute stretch alongside the San Francisco Bay. I looked out of my window, and as the houses passing below decreased in size, the smell of human waste became stronger. The Bay Area is comprised of many different landscapes, types of development, and land uses. Throughout my years growing up in Berkeley, California, I have hiked through many green, coastal trails, and I have driven down many streets lined with auto body shops and factories with tall trails of pollution spewing from their stacks. As I became older and learned about concepts of social justice and unequal access to societal goods and services, I began to see more clearly the intersection between environment, social, and medical equity. I began to question why the beautiful sights and smells of redwoods and sequoias from Tilden Park

surround the extravagant houses of affluent, primarily white residents of the Berkeley Hills. Moreover, why do the residents of West Oakland, a primarily Black area with an average income significantly lower than that of nearby communities, find themselves inhaling dangerous chemicals from the bleak factories, and heavy diesel truck traffic going to and from the Port of Oakland on a daily basis?[1]

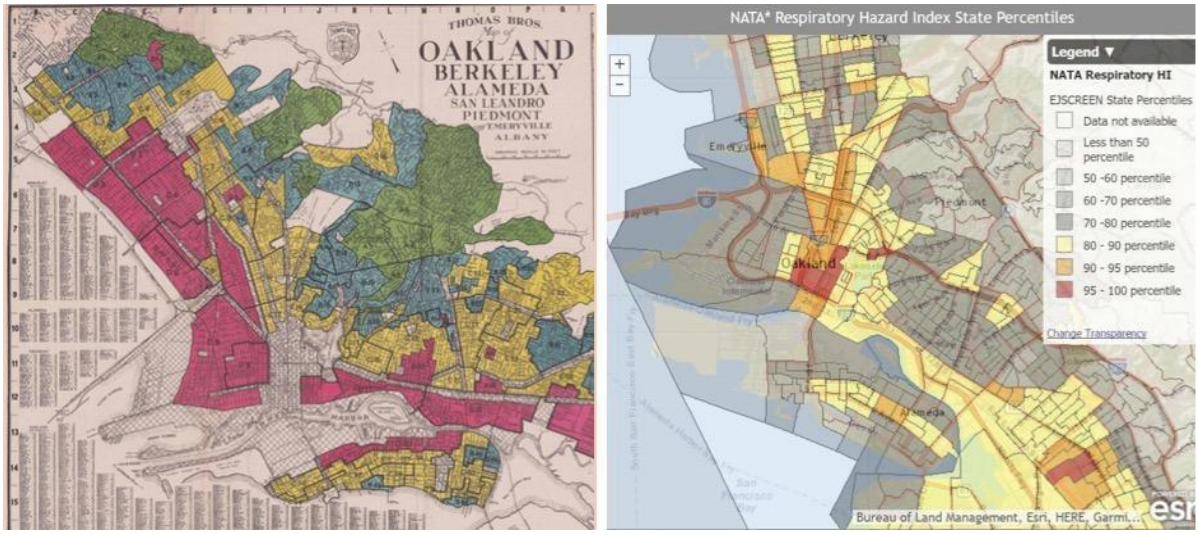
As a freshman at Berkeley High School, I was surprised to learn that my home city, as well as many other Bay Area cities, has a history of redlining. Redlining refers to discriminatory lending practices put in place to prevent people of color from buying houses in white neighborhoods. The use of race-based risk maps as economic guidelines for loans, which effectively segregated much of the U.S. during a time of massive migration from rural areas to cities, was a government-sanctioned practice from the 1930's until 1968, when the Fair Housing Act was passed to ban such discriminatory practices.[2]

The degree to which Bay Area residential neighborhoods are still heavily segregated is a direct legacy of redlining, and the environmental burdens placed on communities of color persist today. In fact, the historical systematic discrimination of communities of color in the housing sector has resulted in a profound imbalance of environmental amenities and threats, such as access to transportation, grocery stores, hospitals, and polluting facilities. The racial makeup of a neighborhood is a larger determinant of environmental burdens and benefits than income.[3] Sociologist Patrick Sharkey of New York University found that high-income black families with six-figure are more likely to live in poorer quality neighborhoods than white families earning much lower incomes, which illustrates how environmental determinants of health and wellbeing

1 Fisher, 2006
2 Chen, 2015
3 Ibid.

stemming from land use are directly related to land use policy.[4] **Image 1** shown below, which was produced by the Greenlining Institute, reveals a noticeable correlation between modern-day air quality levels and 1937 Bay Area redlined maps.[5]

Image 1: Historic Maps of Redlining Compared to Modern-day Air Quality Measures[6]



Day-to-day quality of life, as well as long-term health and well-being, are largely determined by our environment.[7] The more I have learned about environmental injustices around the Bay Area, around the U.S., and around the world, the more I have wanted to know about the ways in which laws and policies in the U.S. have shaped patterns of land use. Through this project I was able to explore the social equity implications of land use patterns around the San Francisco Bay by means of first-hand GIS mapping. Maps of the permitting history of the SF Bay Conservation and Development Commission (BCDC) reveal a disproportionate number of environmentally burdensome land uses located in highly socially vulnerable communities around the San Francisco Bay. Projects such as ports, industrial, and waste-related development are

4 Ibid.
5 Johnson, 2017
6 Image Source: Johnson, 2017
7 Bullard, 2008

overrepresented in highly socially vulnerable communities, while projects associated with positive community health impacts, such as parks and ecological restoration are underrepresented in those communities. However, the geospatial analysis tools available have a limited ability to accurately convey the disproportionate environmental impacts of land use on socially vulnerable communities in the Bay Area.

III. Collaboration with BCDC

I spent much of the summer of 2018 as an intern at the San Francisco Bay Conservation and Development Commission (BCDC). BCDC is a California state planning and regulatory agency with a complicated jurisdiction that includes, but is not limited to, the 100-foot shoreline band around the San Francisco Bay. During the late 1950's, efforts to fill the Bay with cement and other materials in order to expand development and maritime industry in the Bay's shoreline band threatened to drastically reduce the size of the Bay and destroy valuable natural resources such as wetlands.[8] The rate of fill at the time was an unbelievable 2,300 acres per year, so a group of local citizens mobilized to fight for the protection of the SF Bay, as well as the area surrounding its shore.[9] The rapid filling was addressed in the 1965 The McAteer-Petris Act, which established the San Francisco Bay Conservation and Development Commission as responsible for preparing and enforcing a long-term plan for the Bay.[10] As a result, the main criteria found in BCDC permitting guidelines are that (1) proposed developments around the Bay limit fill as much as possible, and (2) the developments provide "maximum feasible public

8 https://savesfbay.org
9 http://www.bcdc.ca.gov
10 The McAteer-Petris Act, 1965

access."[11] *The Bay Plan* is the main policy document dictating BCDC's power to respond to proposed permits.[12] Through the agency's role in planning and regulating different types of development, BCDC has played an important role in making the Bay a "national recreational treasure" by promoting waterfront development projects that encourage public visitation and promote conservation, while simultaneously supporting the economy through the maritime industry.[13]

BCDC is one of multiple agencies responsible for overseeing permitting in the Bay Area, but only has authority over proposed development projects that touch the 100-foot shoreline band. Due to the regulatory nature of the agency and the way the permitting process works, BCDC does not have control over which development project permits are proposed for which areas of San Francisco Bay's shoreline band. BCDC receives permit proposals with specific, predetermined locations for all proposed development within the agency's jurisdiction. BCDC's authority comes from the *McAteer-Petris Act* and the *Suisun Marsh Preservation Act*, which permit analysts use to give feedback and make suggestions for changes to proposed permits directly to Permittees. Once the permit analysts' feedback has been incorporated into the proposed permit, the Permittee submits a final permit proposal. For Major (large-scale) permits, the BCDC permit analyst makes an official recommendation to The Commission to accept or reject the Major permit based on compliance with land use policy around provision of public access, use of the shoreline, and an advisory review of appearance.[14]

The Commission is a group of 27 individuals representing different local government agencies throughout the nine counties that make up the Bay Area such as Alameda, Contra

11 The McAteer-Petris Act, 1965
12 The Bay Plan, 1968
13 http://www.bcdc.ca.gov
14 The Bay Plan, 1968

Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma county as well as representatives from the U.S. and California State Agencies who meet bi-weekly. The Commission's role is to hear reports on proposed major development projects around the Bay Area, give feedback, and approve or reject applications. For Minor, Administrative, and Emergency permits, different branches within BCDC have the authority to approve or deny the permits without going through the commission. Permit rejections must be grounded in BCDC policy, which means that the proposed development needs to clearly violate a requirement in order for the permit analyst to suggest changes or reject the proposed development. For example, if a permit for a housing development includes a building that exceeds the height limit, a rule designed to protect views of the Bay, the Permittee must alter the building's proposed height or the permit will be declined.

Home to people from all over the world and all different walks of life, the Bay Area is an incredibly diverse place, making it a very vibrant and culturally rich environment. The high level of racial and socio-economic diversity generates a need for the government to ensure that environmental burdens are not placed more heavily on marginalized, historically less politically and socio-economically powerful communities. As an environmental agency responsible for evaluating proposed development in a populous, diverse region, BCDC recognizes the connection between environmental injustices and land use policy throughout the United States. However, Environmental Justice is not part of BCDC's statutory mandate, and so it lacks authority to reject permits based on Environmental Justice concerns, mandate community feedback, engage deeply with communities during the permit process, or suggest that Permittees consider the environmental burdens already placed on the community surrounding newly proposed development. In hopes of introducing such mechanisms, BCDC recently decided to

amend its policy to incorporate environmental justice into the permitting process.[15] As a planing at the agency, I primarily worked with Shannon Fiala and Clesi Bennett to assist in the background research portion of the EJ amendment process.

IV. Literature Review

Before exploring environmental justice implications of land use policies, it may be useful to consider the origins of EJ. In October 1991, the *First National People of Color Environmental Leadership Summit* released "The Principles of Environmental Justice," which is a detailed list of components of the EJ movement.[16] Included in this list are five principles especially connected to land use, which state that Environmental Justice

> " … demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias.
> … calls for universal protection from … production and disposal of toxic/hazardous wastes and poisons… that threaten the fundamental right to clean air, land, water, and food.
>
> … affirms the fundamental right to political, economic, cultural and environmental self-determination of all peoples.
>
> … demands the right to participate as equal partners at every level of decision-making, including needs assessment, planning, implementation, enforcement and evaluation.
>
> … affirms the need for urban and rural ecological policies to clean up and rebuild our cities and rural areas in balance with nature, honoring the cultural integrity of all our communities, and provided fair access for all to the full range of resources."[17]

The Environmental Justice Movement began more than 30 years ago, but popularization, transformation, and acceptance of the field of Environmental Justice into academia is relatively

15 http://www.bcdc.ca.gov
16 https://www.ejnet.org/ej/principles.html
17 https://www.ejnet.org/ej/principles.html

recent.[18] At its inception, the Environmental Justice Movement operated as a push from activists, mostly from within the African American, LatinX, and Native American communities, to recognize and repair the disproportionate environmental burdens being placed on communities of color and low-income communities throughout the United States.[19] Land use is central to both the academic field and movement of Environmental Justice. The ways in which land is developed, used, and maintained largely determines the environmental burdens and benefits experienced by the community inhabiting the surrounding space. Looking at the breakdown of land uses for a given area can inform understandings of which communities are benefiting from different types of development and land use, and which communities are disproportionately exposed to environmental risks.

In *Dumping in Dixie*, Robert Bullard describes how garbage dumps, landfills, salvage yards, automobile shops, and other "unwanted land uses," were disproportionately placed in Black neighborhoods of Houston, Texas, during the 1970's economic boom when Texas got its name as the "petrochemical capital."[20] Bullard argues that developers took advantage of the weak enforcement of deed restrictions in inner-city neighborhoods and lack of zoning laws in order to build their facilities efficiently. For example, the five largest garbage incinerators, all owned by the city of Houston, were located in minority neighborhoods.[21] The history of land use in Houston reflects widespread disparities in development patterns across the U.S. that placed disproportionate environmental burdens on marginalized communities. Many studies assessing health effects of living close to waste disposal and treatment sites have shown that rates of head

[18] Maantay, 2002
[19] Bullard, 1996
[20] Bullard, 2008
[21] Bullard, 2008

pain, respiratory symptoms, gastrointestinal problems, and psychological conditions, and a few studies found higher rates of bladder, lung, and stomach cancer.[22]

As Academia adopted Environmental Justice as a field of study, the term expanded to include more "cross-disciplinary debates about knowledge, representation and meaning" as well as incorporate explanatory social theory and deploy a more diverse range of methodologies for "investigating the material and political content of socio-economic concerns" relating to land use.[23] Gordon Walker, a Geography professor at the University of Lancaster specializing in Environmental Justice, discusses how the field of EJ has moved beyond environmental burdens to include the distribution of environmental benefits and resources, including access to food, transportation, green space, and clean water.[24]

Environmental Health research looking at correlations between pollution levels and community health has helped pave the way to government recognition of widespread disparities in the placement of environmental burdens by substantiating claims of environmental injustices.[25] Many efforts to support the Environmental Justice Movement have employed highly technical and complex methodologies. Technical methodologies have infiltrated mainstream EJ work because, historically, policymakers have proven to be unreceptive to the voices and first-hand narratives of directly affected, often politically powerless communities.[26] Environmental agencies initially adopted the Environmental Justice agenda only after studies based in statistics and GIS revealed the demographic patterns of toxic sites.[27] Activists have needed statistical and visual, numeric data to prove that EJ concerns are valid and must be addressed. These methods

22 Vrijheid, 2000
23 Holifield, et al., 2009
24 Walker, 2009
25 Holifield, et al., 2009
26 Ibid.
27 Ibid.

include GIS mapping and the chemical testing and analysis of air, water, and soil for pollution levels.

Much of the empirical evidence and research on environmental injustice has been in the form of geospatial analysis. Geographic Information Systems (GIS), an integrated system of elements incorporating "information about the real world that has been abstracted and simplified into a digital database" of both spatial and non-spatial features has been crucial for the study of Environmental Justice, as well as for the progress of the EJ Movement.[28] GIS has been used for health related research through the mapping of disease paths, assessment of risk, exposure modeling, studies of disease diffusion and clustering, spatial disparities in health, and other public health inquiries.[29] Specifically, GIS mapping technology is often very useful when asking proximity related questions about pollution and community health, as well as questions about the distribution of place- elated health burdens. For the purposes of EJ, mapping technologies are frequently used to plot out the locations of facilities or other types of land uses associated with a range of impacts on community health—impacts that can be either negative or positive.

As Juliana A. Maantay describes, GIS technology is very fitting for research related to environmental justice, because the tool promotes the amalgamation of a variety of types and sources of data, and the "application of various spatial analytic techniques (e.g., buffering) for proximity analysis."[30] This type of mapping tool allows for the visualization and quantitative analysis of spatial patterns of land use and pollution alongside demographic information on income, race, and other factors that contribute to social vulnerability. GIS mapping has been integral to the official recognition of environmental injustices in cases such as a Proximity Radio

28 Maantay 2007
29 Ibid.
30 Maantay, 2011

to assess exposure to hazardous materials in Minneapolis and a GIS map of the spatial patterns of different pollutants at a hazardous facility in Pennsylvania—in both of which marginalized communities were heavily impacted.[31] With this type of technical proof of environmental injustices, governments are often more willing to recognize inequities and allocate resources to addressing them.

In the process of attempting to highlight and minimize geographical inequities, many academics have effectively taken away the agency and voices of the communities that are most impacted by cases of environmental injustice. Individuals who, for example, wake up each morning to see their children suffering from asthma caused by the highway running next to their home have a right to participate in discussions around the injustice and ways to address the problem. Impacted communities must be brought into EJ conversations to speak to their own experiences and make decisions about where problems lie, what questions to ask, and how to approach possible solutions.[32] The Environmental Justice academics often use overly technical methodologies, many of which are completely inaccessible to much of the U.S. population, which exacerbates the marginalization that socially vulnerable communities already experience. The creation of a new, highly technical standard of "proof" lessens the value of community narratives and claims of environmental injustices based on personal experiences by setting an expectation of visual evidence for policy-makers. Maps alone cannot provide the full picture of what is happening in cases of environmental injustice—there is a strong need to incorporate the communities who are directly impacted by environmental injustices on a daily basis.

In *The Truth, the Whole Truth, and Nothing but the Ground-Truth,* James Sadd explores ways to bridge the gap between the "technical work and the expert knowledge of local residents"

[31] Maantay 2002
[32] Sadd, 2014

through community-based participatory research strategies.[33] Sadd argues that in order for environmental justice research to be effective in reducing both isolation and the social, economic, and political repression of disadvantaged communities, collaboration is essential. Community-based participatory research (CBPR) methods involve academic and community collaboration throughout every step of the process: choosing the best research questions, deciding on the most effective study design, collecting and analyzing data, interpreting any findings of the data, and communicating those results to policy makers.[34]

Additionally, the use of mapping tools to show inequitable distributions of land uses associated with environmental burdens gives the false impression that without distributional inequalities, injustice cannot exist.[35] Rather, these maps help to illuminate just one type of environmental injustice. Setting the standard for proof of distributional inequalities pushes many other types of environmental injustice to the sidelines, and invalidates cases in which the time and resources to map out or chemically test environmental burdens is not available or inaccessible. Access to education around different mapping technologies such as GIS is limited, and even for individuals who are trained in GIS, the software program is expensive.

Many challenges arise in the process of utilizing mapping tools to analyze the reach of harmful pollutants due to the complexity of spatial relationships between health and place, unreliability of data sources, the modifiable areal unit problem--which describes analytical bias resulting from a mapper's choice in size of units used and scale of division for the area of study -- as well as difficulty in maintaining a consistent variable selection.[36] Exposure to toxins or

[33] Sadd, 2014
[34] Sadd, 2014

[35] Goodson et al., 2015

[36] Holifield, et al., 2009

pollutants and access to environmental benefits have a complex and multidimensional connection to health and well-being, so measurements of linear distances between polluting, or otherwise harmful facilities, to communities living nearby do not fully represent the complicated spatialities of environmental injustices.

The "paths of chemicals in air, water, and soil are spatio-temporally complex," so linear buffers are inadequate in representing the distribution of pollutants through different air and water circulatory systems.[37] Different types of pollutants and individual chemicals have various ways of infiltrating the environment, and their paths of pollution through air, water, etc. are by no means uniform.[38] Even complex dispersion models have a limited ability to accurately show or predict exposure or scale of impact because they do not account for non-point-based pollution sources including car exhaust, require extremely detailed but hard to find informational inputs about emissions and facilities, and depend on meteorological and topographic assumptions that might not be true.[39] Beyond the difficulty that comes with accurately representing the scale and reach of different toxins and pollutants, physical bodies of people of different ages, genders, races, and levels of fitness respond to pollutants in different ways.[40] The culmination of these factors means that the ways in which vulnerabilities are distributed among "bodies, households, and neighborhoods-does not map neatly onto census-defined demographic maps."[41]

The use of geospatial analysis in EJ has the potential to oversimplify the relationship between place and health and create unhelpful binaries around the implications of socio-economic status and environmental risk.[42] There are many factors that interact to determine the

37 Holifield, et al., 2009
38 Walker, 2009
39 Maantay, 2002
40 Walker, 2009
41 Holifield, et al., 2009
42 Walker, 2009

short and long-term impacts on both the individual and community health, and environmental burdens directly resulting from land use

Walker also discusses how one must look beyond the one-dimensional spatial distribution of outcomes and impacts on health and wellbeing when assessing environmental injustices. Simplistic approaches to geospatial analysis are not able to properly capture the complexities of land use or the scale or type of impact. Smells, sights, and other important forms of qualitative information observable from the ground are not shown, especially when mapping a large number of coordinates. Because of this, Maantay says that "no map can be viewed as an objective embodiment of the real world," in part due to the fact that all maps are intrinsically bias.[43]

When asking questions about which communities are being most impacted by land use, social vulnerability measures are also difficult to thoroughly and accurately represent. Many indexes of social vulnerability depend on census data, which is often incomplete or misleading.[44] In many cases it is necessary to look at a region on a street to street basis to discern patterns of disproportionate impact, but census block groups, which are the smallest geographical unit used to display population data, often do not allow for that level of precision. This type of cursory mapping also frequently fails to inform viewers on which land uses began at which points in time, as well as the timeline of population change in a given area. Without longitudinal data, it is impossible to assess whether burdensome land uses were developed before or after an area became populated with socially vulnerable populations.

Many scholars have explored the question of whether or not discriminatory intent is at the base of land use patterns that disproportionately impact low-income communities and communities of color in the U.S. Ryan Holifield, Professor of Geography at the University of

[43] Maantay, 2002
[44] Erb, 2007

Wisconsin, Milwaukee, analyzes the phenomenon of environmental injustice through a Marxist lens, arguing that land use based environmental inequalities stem from "forces of global capitalism" and colonization.[45] Similarly, other scholars have argued that environmental injustices are a direct result of our market-based economic system, in which the differences in land values dictate the placement of unwanted or harmful facilities instead of placing responsibility on discriminatory land use policies.[46] Pulido's work analyzing case studies of environmental inequalities in Southern California shows that the multi-layered history of "planning practices, racialized divisions of labor, and other processes" behind the environmental injustices present in today's world must be addressed, asserting that the simplistic question of "Who came first?" is outdated.[47] In *Rethinking Environmental Racism*, Pulido goes on to discuss how white flight, suburbanization and decentralization from densely-populated urban areas, and the general movement of white communities away from "older industrial cores" act as agents of environmental racism.[48] This is exemplary of a larger shift away from thinking of environmental justice, and environmental racism as intentional, distinct actions and decisions.

It is extremely difficult to evaluate the "fairness" of the processes of distribution, and hard to thoroughly evaluate the options that communities or individuals have to escape areas heavy with environmental burdens or access environmental resources.[49] A common school of thought is that even if it were possible, it is not necessary or helpful to prove discriminatory intent. Instead, any patterns of land use or policy-making processes that burden minority groups disproportionately can be labeled environmental racism.[50] Robert Bullard describes how

45 Holifield, et al., 2009
46 Maantay, 2002
47 Pulido et al., 1996
48 Pulido, 2010
49 Walker, 2009
50 Holifield, et al., 2009

"environmentalism is now equated with social justice and civil rights," which illustrates how the concept of environmental justice has expanded understandings and become more far-reaching in its implications of social equity.[51] Both the academic field and the movement of EJ are constantly changing and expanding, and as conceptions of spatial justice develop, technical tools such as GIS mapping will continue to play a crucial role in providing visualizations and platforms for statistical analysis of land-use related inequities.

V. Land Use Policy in the Bay

The environmental agencies responsible for permitting development projects in the San Francisco Bay Area are the State Lands Commission, the California Coastal Commission, U.S. Fish and Wildlife Service, and the Army Corps of Engineers. Both the California Coastal Commission and the California State Lands Commission have published draft Environmental Justice policy amendments addressing a range of Environmental Justice concerns. Central themes of State Lands Commission's EJ amendment are the need for agencies to promote equitable access to public resources, increase current levels of transparency and public engagement and involvement in decision-making processes, identify and consider socially vulnerable communities living or spending time near proposed development, foster collaboration with affected groups, and to build and maintain trust with said groups.[52] These components of environmental justice are reflective of the larger shift in consideration around land use policy happening on many scales of government. Additionally, coastal access is a primary concern for both the California Coastal Commission and BCDC, as both agencies recognize the importance

[51] Bullard, 2002
[52] California State Lands Commission, 2018

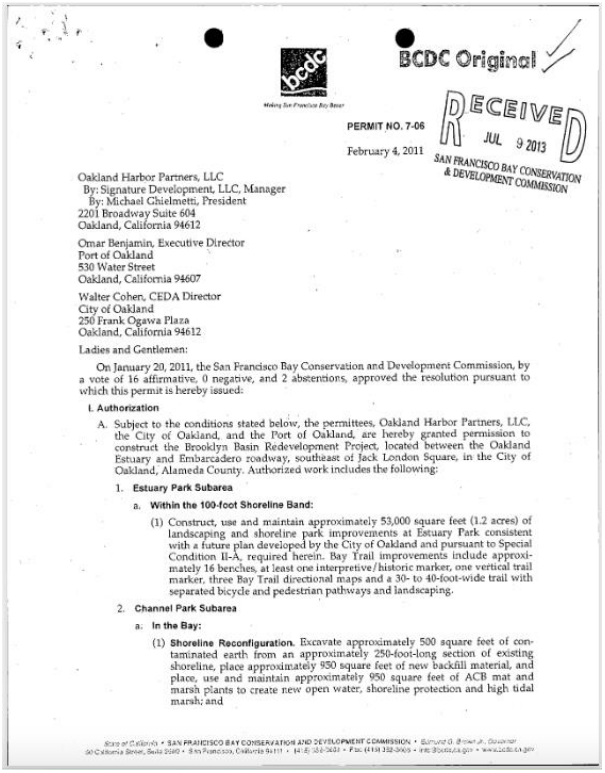
of promoting equitable access to environmental benefits as well as preventing marginalized communities from bearing disproportionate environmental burdens.[53]

VI. Methodologies

Since its founding in 1965, BCDC has been responsible for issuing permits for virtually all development touching the 100-foot shoreline band directly around the Bay. BCDC's history of permitting paints a picture of land use patterns in the region surrounding the Bay, which informs questions about environmental justice and social equity. As the agency searches for ways to amend agency policy to incorporate social equity, BCDC decided to gather information on past permitting and look at it from the lens of social equity. West Oakland, East Oakland, Richmond, Vallejo, Marin City, San Rafael, Bayview Hunters Point, Alviso, and East Palo Alto were all identified by BCDC as regions to look into for environmental injustices due to their social vulnerability. There are many thousands of permits in BCDC's permit database, called BayRAT, each of which is classified as a Major, Minor, or Emergency permit, depending on the scale and nature of the project. Major permits are the largest scale, and therefore have the greatest potential to impact surrounding communities. Because environmental justice is focused on the impact of land use on different communities, the BCDC EJ team and I agreed that Major permits would be the most helpful in informing us of historic patterns of land use associated with environmental burdens and benefits.

Image 2: BCDC Permit File. Shown below is the first of ninety six pages of the permit for the Brooklyn Basin Redevelopment Project approved by BCDC in 2011. This is a typical permit file, with extremely detailed descriptions of the proposed development and descriptions of how the Permittee is going to meet BCDC guidelines.

[53] California Coastal Commission, 2018

Even after  limiting the scope of

BCDC Original

RECEIVED
JUL 9 2013
SAN FRANCISCO BAY CONSERVATION & DEVELOPMENT COMMISSION

PERMIT NO. 7-06

February 4, 2011

Oakland Harbor Partners, LLC
By: Signature Development, LLC, Manager
By: Michael Ghielmetti, President
2201 Broadway Suite 604
Oakland, California 94612

Omar Benjamin, Executive Director
Port of Oakland
530 Water Street
Oakland, California 94607

Walter Cohen, CEDA Director
City of Oakland
250 Frank Ogawa Plaza
Oakland, California 94612

Ladies and Gentlemen:

On January 20, 2011, the San Francisco Bay Conservation and Development Commission, by a vote of 16 affirmative, 0 negative, and 2 abstentions, approved the resolution pursuant to which this permit is hereby issued:

I. Authorization

A. Subject to the conditions stated below, the permittees, Oakland Harbor Partners, LLC, the City of Oakland, and the Port of Oakland, are hereby granted permission to construct the Brooklyn Basin Redevelopment Project, located between the Oakland Estuary and Embarcadero roadway, southeast of Jack London Square, in the City of Oakland, Alameda County. Authorized work includes the following:

1. **Estuary Park Subarea**

a. **Within the 100-foot Shoreline Band:**

(1) Construct, use and maintain approximately 53,000 square feet (1.2 acres) of landscaping and shoreline park improvements at Estuary Park consistent with a future plan developed by the City of Oakland and pursuant to Special Condition II-A, required herein. Bay Trail improvements include approximately 16 benches, at least one interpretive/historic marker, one vertical trail marker, three Bay Trail directional maps and a 30- to 40-foot-wide trail with separated bicycle and pedestrian pathways and landscaping.

2. **Channel Park Subarea**

a. **In the Bay:**

(1) **Shoreline Reconfiguration.** Excavate approximately 500 square feet of contaminated earth from an approximately 250-foot-long section of existing shoreline, place approximately 950 square feet of new backfill material, and place, use and maintain approximately 950 square feet of ACB mat and marsh plants to create new open water, shoreline protection and high tidal marsh; and

State of California • SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION • Edmund G. Brown Jr., Governor
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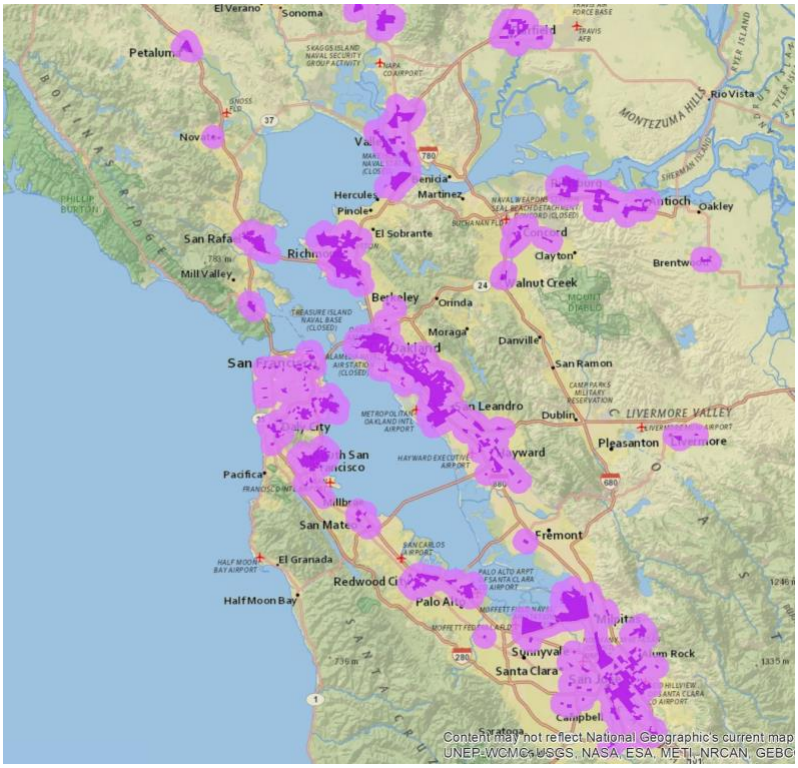
the project to Major permits, 602 records remained, many of which were between thirty and one hundred pages, like the permit in **Image 2** above. When discussing how best to gather information on patterns of development from the lens of social equity, the original plan was to look through these major permit records for development projects in the areas of interest and analyze the environmental justice implications of said projects. I began sorting through the lengthy BayRAT spreadsheet to find and read permits within the geographic regions identified as areas of interest by BCDC's environmental justice team, but quickly realized that the time necessary to complete such a process exceeded my summer internship. Having worked with GIS mapping in previous classes and academic projects, I saw an opportunity to utilize this mapping tool to visualize the distribution of different types of permits.

For the purposes of a different BCDC project called ART (Adapting to Rising Tides), BCDC staff had previously identified a set of indicators to determine an area's social

vulnerability and converted their data to a map layer. The CDC defines Social vulnerability as a community's resilience to external stresses on human health, which can be evaluated by a set of indicators relating to risk and resilience.[54] The ART team constructed this spatial social vulnerability layer based on a set of indicators relating to data on income, race, education level, mobility, and language isolation. I was able to map the geographic coordinates of development projects included in BCDC's permit database, along with ART's social vulnerability GIS map layer to test the hypothesis that highly socially vulnerable communities bear a disproportionate burden of environmental costs. The block groups in this social vulnerability layer were classified by the ART team as having low, moderate, or high, or highest social vulnerability depending on how many of the social vulnerability indicators were in high percentiles for the given block group populations. In order to best assess the potential environmental justice implications of BCDC permitting history, I decided to focus on the block groups designated as having the highest level of social vulnerability, which means that the block group's population was in the 70th percentile for eight or more of the ten social vulnerability indicators.

[54] U.S. Department of Health & Human Services, 2018

Map 1: ART identified most socially vulnerable communities



The BCDC EJ team and I discussed what an appropriate buffer would be to account for the scale of potential community health effects. Based on previous studies on buffer use in geospatial analysis of land use based environmental injustices, we decided to add a 1-mile buffer around ART identified socially vulnerable communities when looking at permits falling into the above categories associated with negative community health impacts.[55] As is shown above in **Map 1**, the areas shaded in dark purple represent ART identified most vulnerable communities, and the lighter purple areas surrounding AIMVC's denote the 1-mile buffer.

Different types of permits and subsequent land uses have different varieties, and magnitudes, of community health impacts on the populations that surround them. To account for these differences, I divided the major permits from the BayRAT database into specific permit

[55] Maantay, 2007

types. BCDC has been trying to label all permits by sub-type for a while, so this was a great opportunity to help organize BayRAT while simultaneously moving toward my goal of examining different types of major permits from a socio-spatial perspective. The permit project type list provided by BCDC has a total of fifty three permit project types ranging from hotels to ecological enhancement. After going through each of the 600 plus major permits in BayRAT, I was able to label most of their types based on the short permit descriptions included in one column of the spreadsheet. However, for the roughly 250 permits with inadequate or missing descriptions, I read through the full permit file to determine the type or types to label the permit. Most of the major permits were dredging, mooring, or residential, which are difficult to assess from an EJ lens.

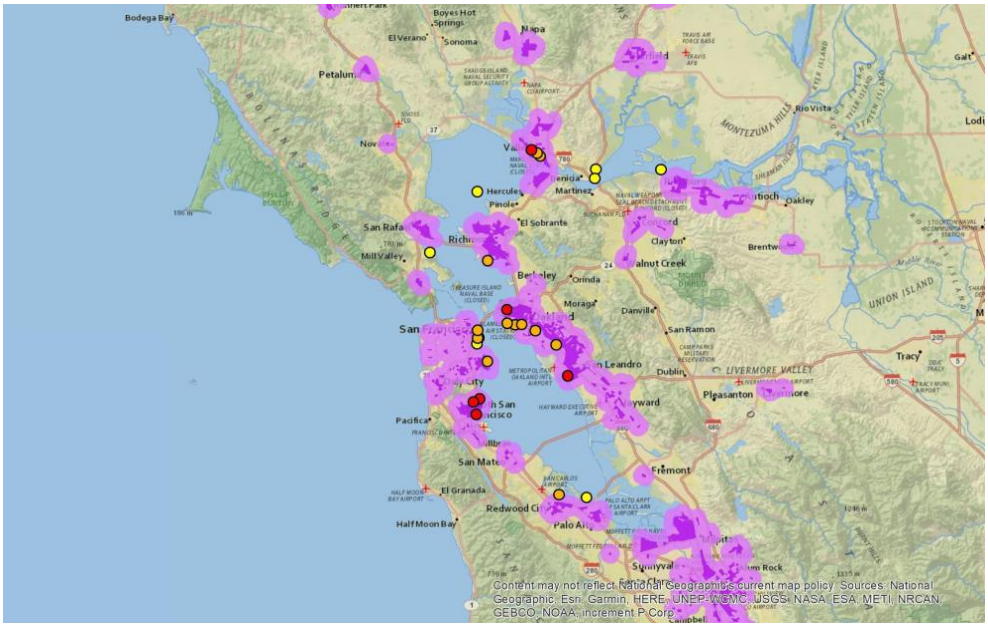
After labeling the types of all of the major permits, I worked with Shannon and Clesi to refine the full list of permit project types to include only the types we determined to be especially relevant to environmental justice concerns around positive and negative community health impacts. The final list included the following permit project types associated with negative community health impacts: Airports, Fuel Pipelines, Industrial, Oil and Gas, Outfalls, Ports, Shoreline Protection, Trails, and Wharfs. Community health impacts associated with land uses common among these permit types primarily impact air quality, and are more widespread than the exact boundaries of the permit or land being used. For example, port activities often produce air pollution that has the potential to cause health detriments to people living miles from the source. I also chose to include major permits falling under the categories of Ecological Enhancement, Flood Control, Parks, Remediation and Ecological Restoration due to the positive community health and wellbeing impacts associated with their land uses. No buffers were added to these maps because the community health impacts are not considered to be as far-reaching. In

fact, Flood Control development projects actually have the potential to displace water and magnify flooding in communities directly adjacent to floodwalls, levees, or other physical flood control barriers.[56]

For each major permit project type, I made a CSV spreadsheet with all information, including x, y coordinates, for the permits within that category. I uploaded each CSV file as a layer to the map with spatial social vulnerability data. Once I had constructed a map with layers showing the geographic distribution of each group of permit types, as well as the map layer showing the block groups home to ART-identified most vulnerable communities (AIMVC), I was able to turn each layer on and off as I pleased. With this map I could analyze the distribution of each group of permits in comparison to the other groups of permits, how they were distributed in or around AIMVC's, and how many permits fell within the buffer zones around AIMVC's. **Map 2** below of all major permits identified as Industrial shows how I was able to place the AIMVC layer in dark purple with the one-mile buffer around it in light purple, and color code the permits based on their proximity to AIMVC's. The points in red represent the coordinate locations of each Industrial permit falling directly within an AIMVC, while orange points represent industrial permits in the 1-mile buffer around the AIMVC's. Points in yellow fall outside of both the AIMVC and the 1-mile buffer zone around them.

Map 2: Major Industrial Permits

[56] U.S. Army Corps of Engineers, 2007

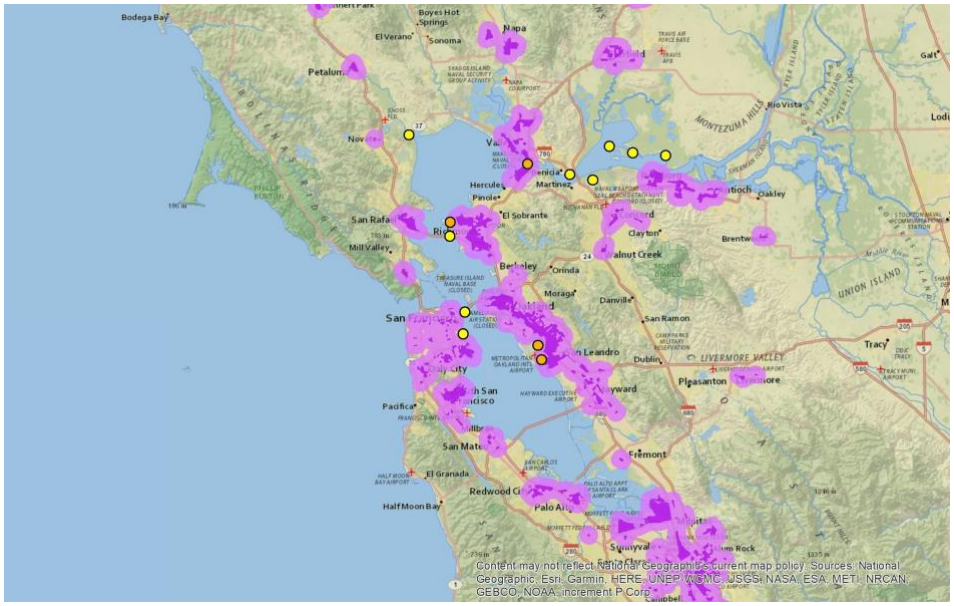


I realized that the proportions of each type of permit found within the AIMVC would have more significance if I could find out exactly how much of BCDC's total jurisdiction they represent. So, to contextualize the number of permits from each type group found within ART-identified most vulnerable communities, I worked with BCDC planner and ART GIS specialist Elizabeth Felter to calculate the percent by area and by population that the ART identified most socially vulnerable communities make up. My mapping project looks exclusively at permits in BCDC's database, so we found the area and population of AIMVC within BCDC jurisdiction. BCDC's jurisdiction changes depending on the size of the Bay and which areas are designated as "Priority Use Areas" at a given time. Using the most recent data on BCDC jurisdiction from July 2018, Elizabeth and I found BCDC jurisdiction to be a total of 50 square miles with a population (calculated based on the number of people in the block groups contained in the region) of 904,000 people. The ART identified most vulnerable communities within BCDC's jurisdiction represent 6% of this 50 square mile area and 11.5% of the total population.

VII. Project Results

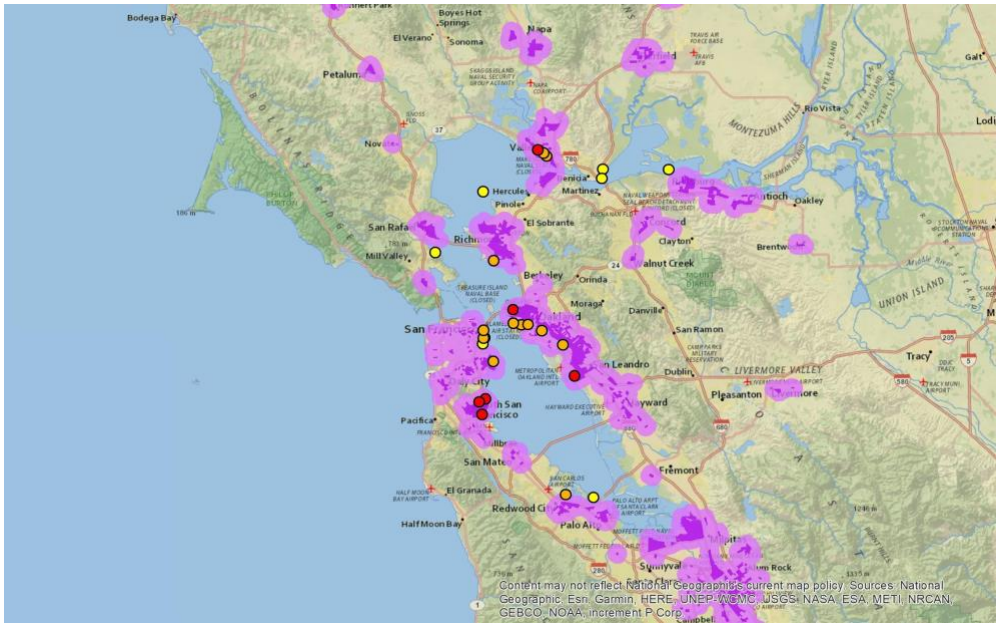
After completing the mapping process for Airport, Ecological Enhancement, Flood Control, Fuel Pipeline, Industrial, Oil and Gas, Outfall (sewage-related), Wastewater, Parks Industrial, Port, Remediation, Ecological Restoration, Shoreline Protection, Trails, and Wharf major permit groups and finding contextual data on the relative area and populations of ART identified most vulnerable communities, I was able to export a map for each group of permit project types showing all of the permits mapped on top of the AIMVC's. The following are maps of permit group types associated with negative community health impacts:

Map 3: Fuel Pipelines, which are "highly prone to corrosion" are a source of leaks and spills that pose threats to human health through the contamination of drinking water, local seafood, and fires.[57]

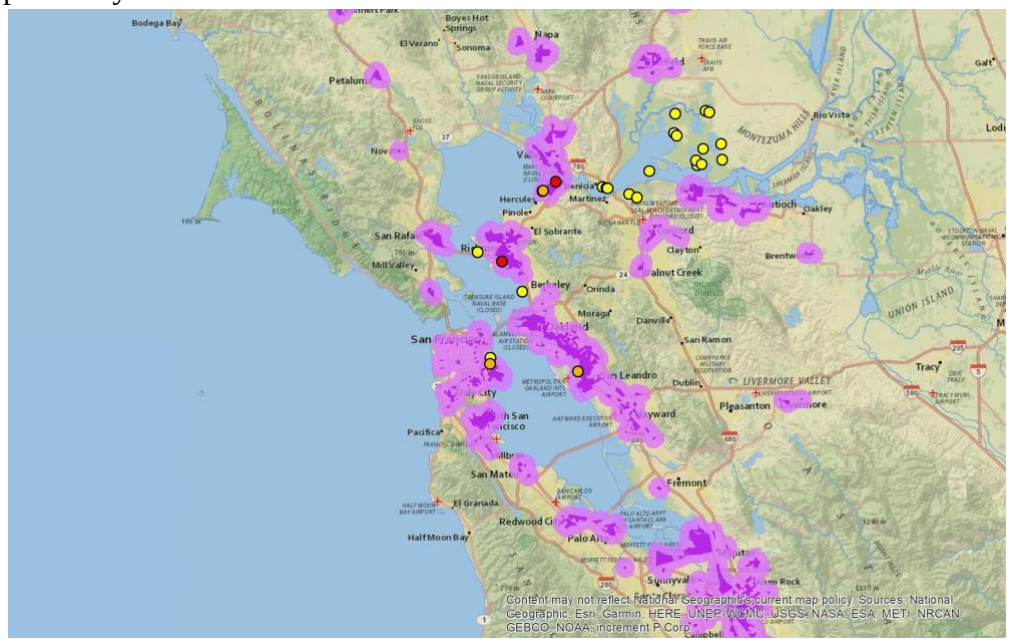


[57] O'Rourke et al., 2003

Map 4: Industrial development, which results in industrial emissions, is linked to a variety of health detriments including but not limited to respiratory illness.[58]

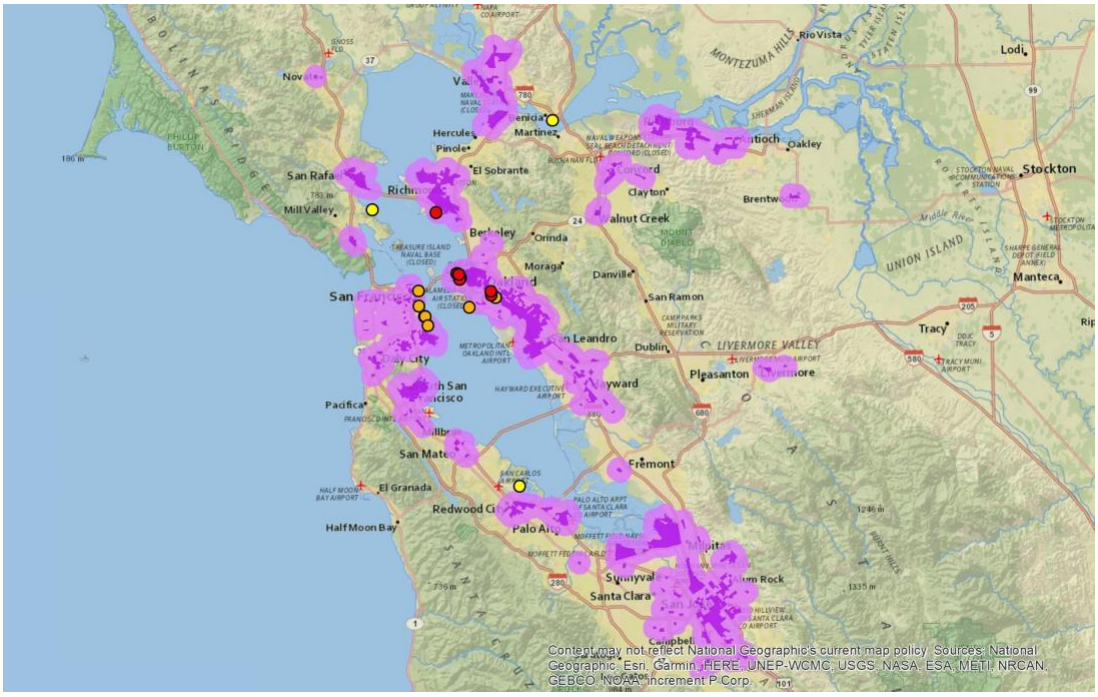


Map 5: Oil and Gas related permits, including a number of refineries and drilling exploration projects, are shown to increase cancer rates for humans living in close proximity.[59]

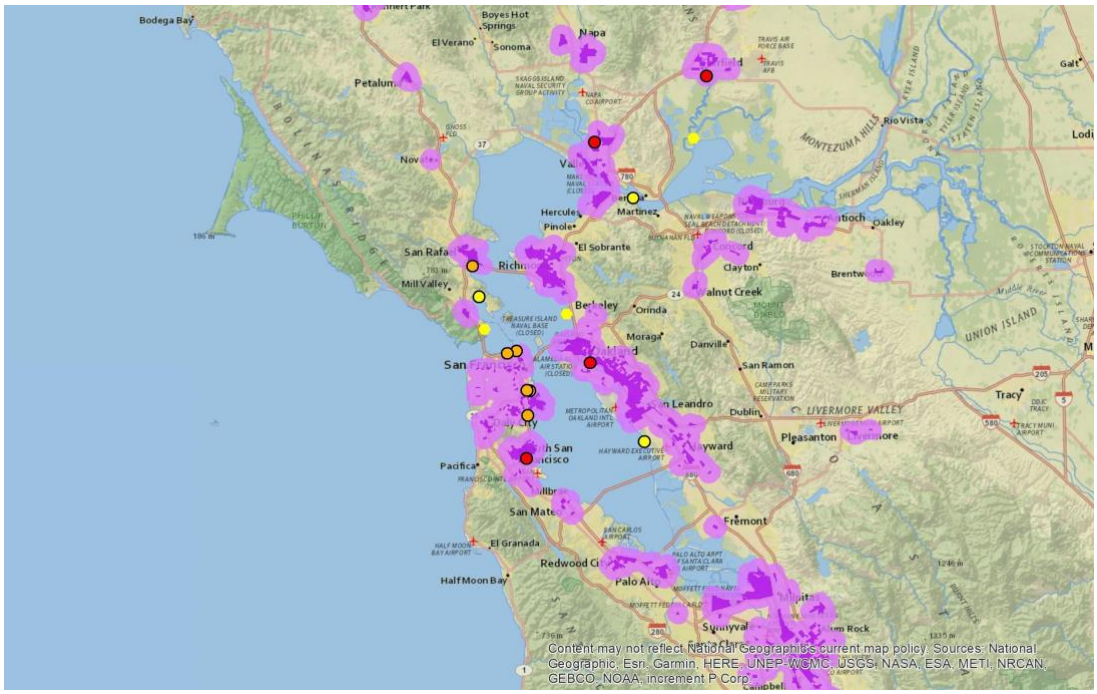


58 Martinez, 2005
59 Abdel-Shafy et al., 2016

Map 6: Port-related development is associated with harmful air pollution.[60]



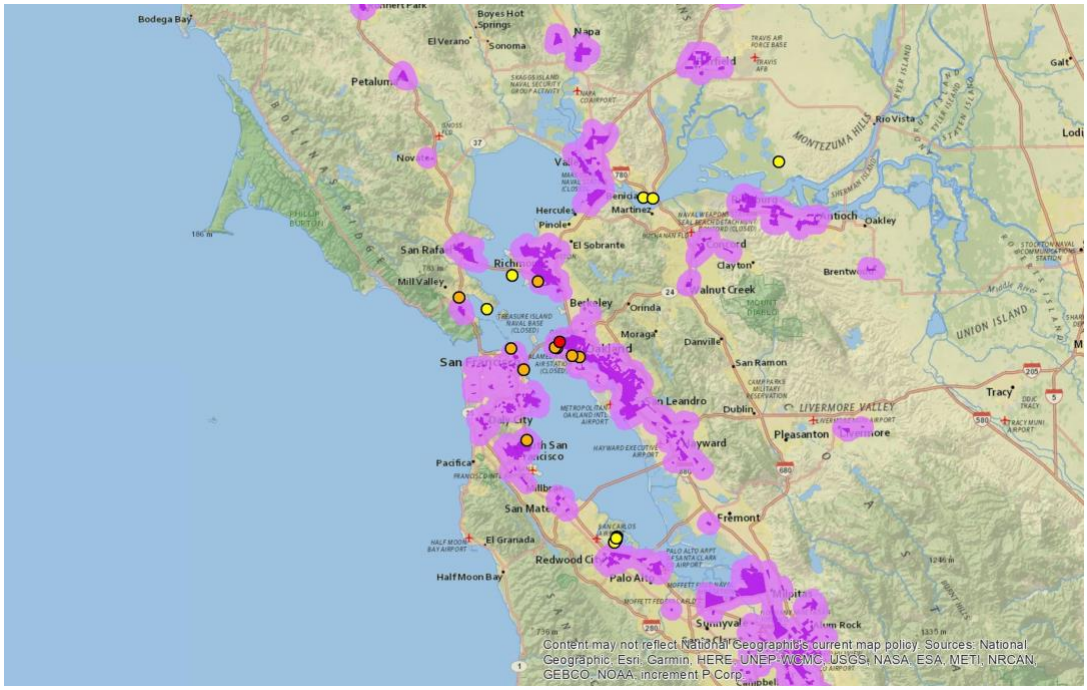
Map 7: Wastewater Treatment and Outfalls have been shown to lower air quality of surrounding areas and proliferate water contamination, both of which have harmful effects on human health.[61]



60 Giuliano et al., 2007

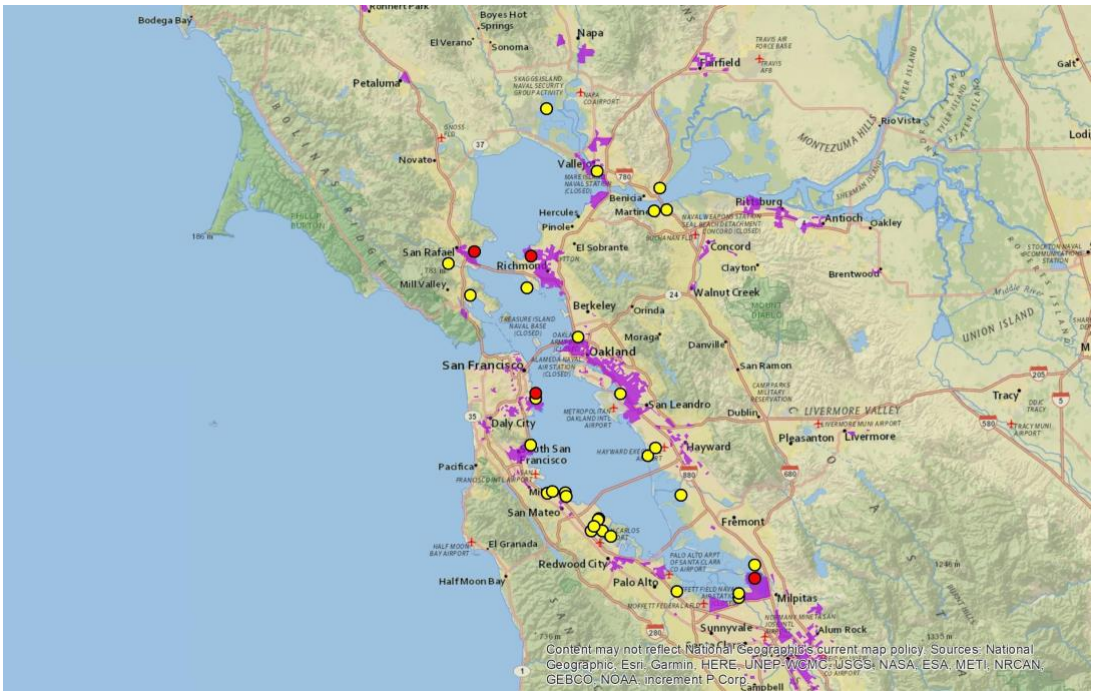
61 Dallmann et al., 2011

Map 8: Wharfs, similar to ports, increase levels of harmful air pollution.[62]



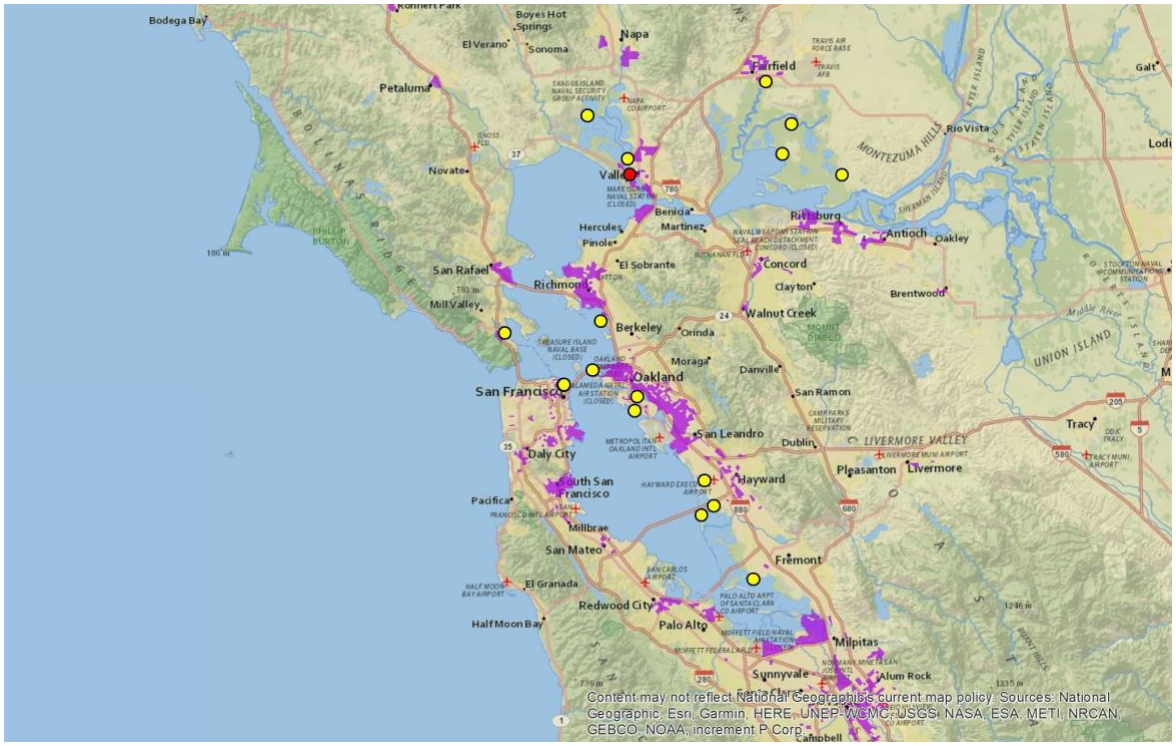
Maps of Project Types Associated with Positive Community Health Impacts:

Map 9: Flood Control

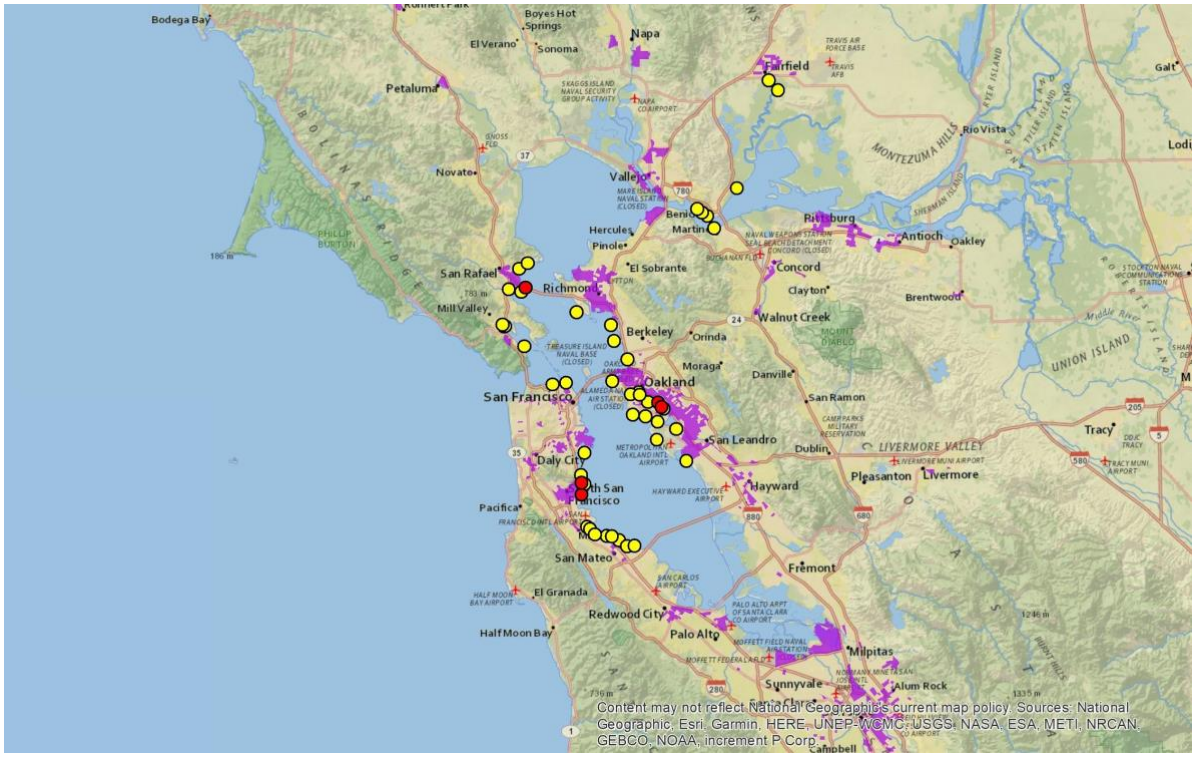


[62] Giuliano et al., 2007

Map 10: Ecological Restoration



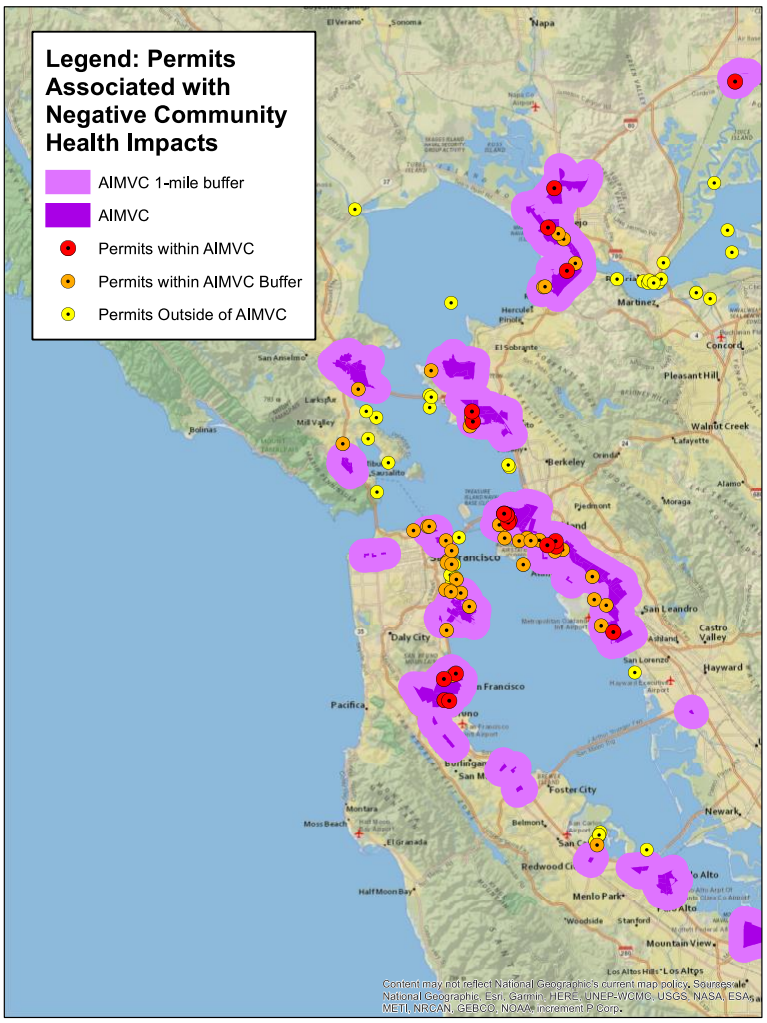
Map 11: Shoreline Protection



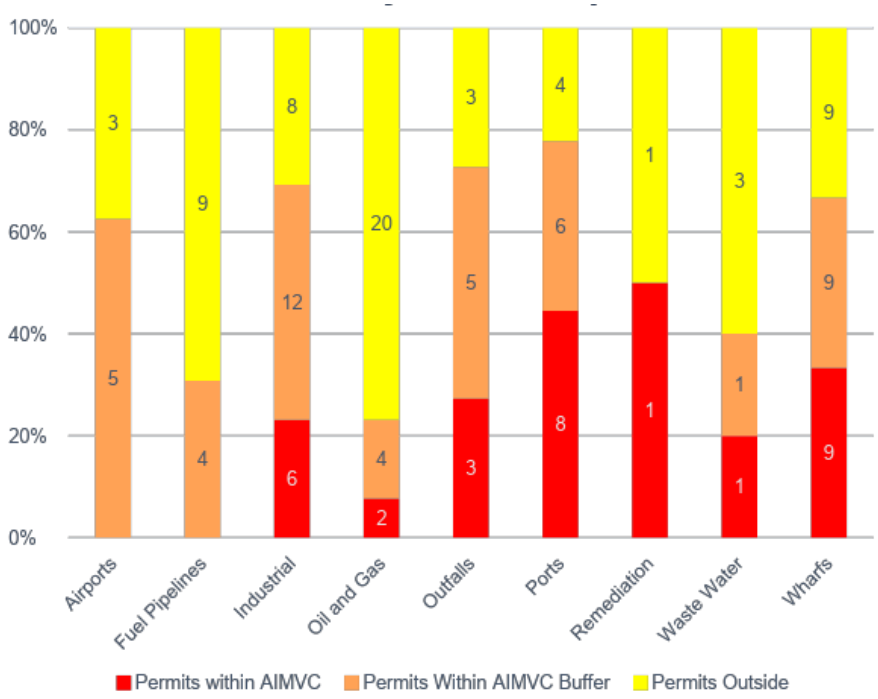
VIII. Analysis of Findings

From this array of maps, I was able to use GIS spatial analysis tools to break down the proportion of each type of permit found within, or nearby ART identified most vulnerable communities.

Map 12: All BCDC permits associated with detrimental community health impacts. These permit types include Airports, Fuel Pipelines, Industrial, Oil and Gas, Outfalls, Ports, Remediation, Waste Water, and Wharfs.



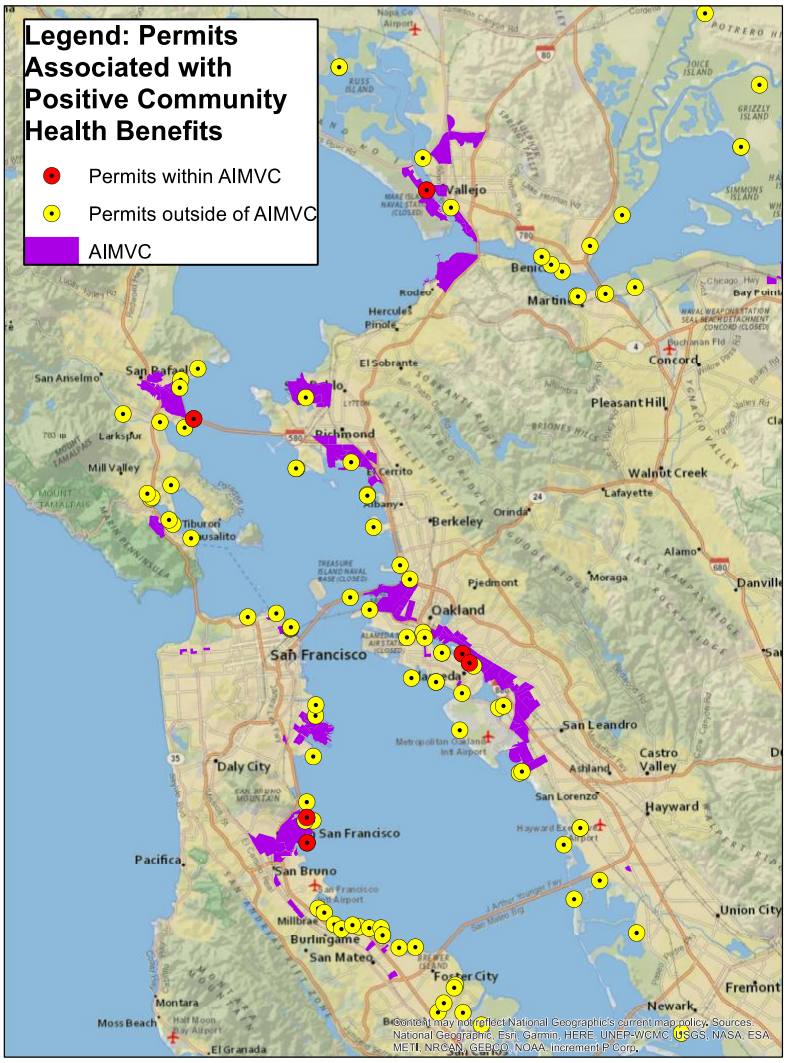
A. **Graph 1:** Distributional Breakdown of Permit Type Groups Associated With Negative Community Health Impacts: 23% of all Major Permits Associated with Negative Community Health Impacts are found within an AIMVC; 55% are found within 1 mile of a community identified as socially vulnerable.



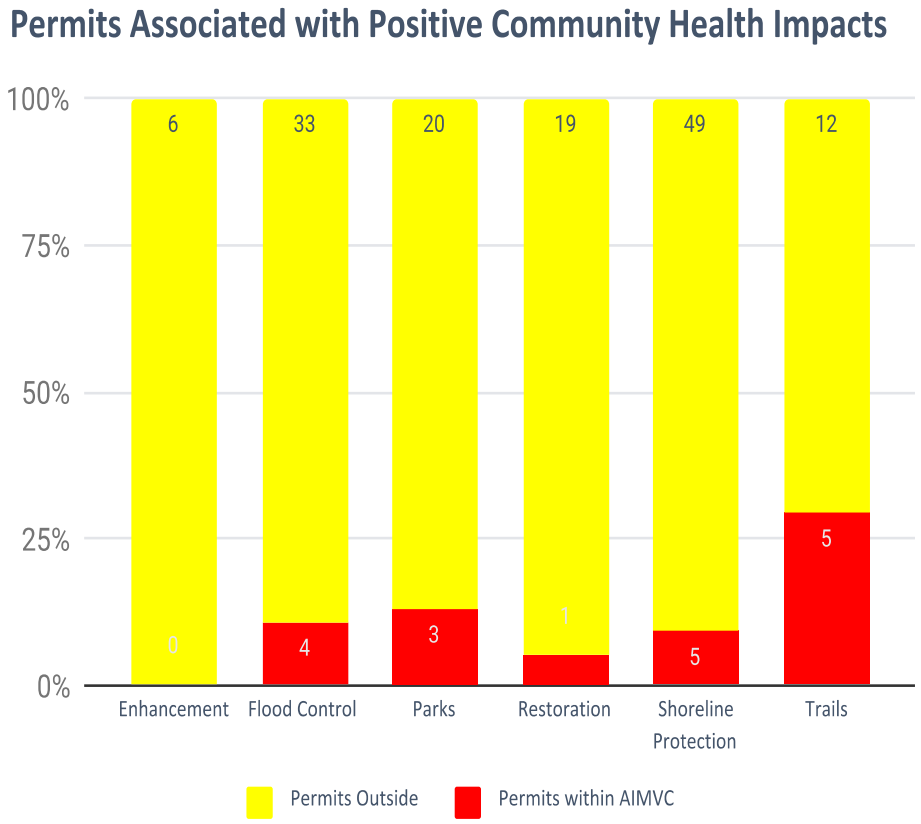
BCDC major permits associated with negative community health impacts were disproportionately located within ART identified most vulnerable communities. Although AIMVC only account for 6% of the total area and 11% of the population within BCDC's jurisdiction, they are home to 23% of all permits associated with negative health impacts. When the 1-mile buffer zone around AIMVC's are included in calculations of permit distribution, a full 55% of the major permits associated with negative community health impacts are located either in an AIMVC or within a mile of one. Of permit types associated with negative community health impacts, Oil and Gas has the smallest proportion, 23.1% of permits falling directly in, or within one mile of, an AIMVC. Port-related permits have the highest proportion (out of permit types associated with negative community health impacts), 77.8%, in or within one mile of an AIMVC. From this breakdown of the geographic distribution of major BCDC permits, which for the most part are representative of land use patterns directly around the San Francisco Bay,

communities labeled as highly socially vulnerable do bear a significantly higher proportion of environmental burdens stemming from land use.

Map 13: All BCDC permits associated with detrimental community health impacts. Such permit types include Ecological Enhancement, Flood Control, Parks, Ecological Restoration, Shoreline Protection, and Trails.



Graph 2: Distributional Breakdown of Permit Type Groups Associated With Positive Community Health Impacts: 11% of all Major Permits Associated with Positive Community Health Impacts are found within an AIMVC.



In comparison to major permits associated with negative community health affects, BCDC records of permits associated with positive health impacts are drastically underrepresented in AIMVC. For the permit types shown in **graph 2** above, the average percentage of permits from each group located within an ART identified most vulnerable community was 11%. If these findings are indeed representative of land use patterns around the S.F. Bay, ART identified most vulnerable communities are not benefitting from positive land uses to the same degree as less socially vulnerable communities are, or to the same degree that they are burdened by land uses associated with negative community health impacts.

This project demonstrates how mapping land use can be very informative of patterns of impact that would not be visible in the same straightforward way without the use of such tools.

When looking back at permitting histories to get a general sense of the distribution of permits associated with different types of environmental benefits and burdens, GIS mapping and analysis is useful. The striking disparities in concentration of different types of permit groups found in this project highlight patterns of land use with clear environmental injustice implications.

Limitations of Findings

Spatial data is typically represented by either points, lines, or polygons on GIS maps. The way data shows on a map is determined by the form of the data being input into the mapping program. Frequently, data sets will list location as a GPS coordinate, which is a single point on a map. Point-based data sets do not give us information about scale of land use, or qualitative information. This project used geographical data from BayRAT, which is in the form of GPS coordinates. These coordinates do not show the size of the land area approved for development. Without information on the full area taken up by the land use, it is difficult to discern the scale of impact the permit will have on community health. Because of this point-based system, it is probable that some of the major permits from both permit type groups associated with negative and positive community health impacts do fall in or within the 1-mile buffer of AIMVC. There is no way to predict exactly how this type of improved precision would change the findings of this project, but the proportions would likely differ from current analysis. For example, by looking at the map of park permit distribution, one can determine where one point of the parks are, but it is unclear how large the parks are, how much grass can be found, how many trees, whether there is a play structure, whether the park is well-lit at night, etc. In order to fully assess the environmental benefits a park provides to its surrounding community, one must know more

about the nature of the park. Similarly, **Image 3** below of an Oakland port conveys how the qualitative details of land use not represented by small points.

Image 3: Satellite Image of Port

Data sources are another category of limitation for mapping projects such as this one. Social vulnerability information comes from census data, which is often unreliable or incomplete.[63] The source of spatial permit data for this project, BayRAT, doesn't include any permits or development data from before the agency's founding in 1965. Much of the industry-related land use around the S.F. Bay was permitted before BCDC's inception and is therefore not accounted for in this analysis. Lastly, this project only includes BCDC's major permits, but many permits falling under the minor, administrative, and emergency permit categories also have social equity implications. In general, mapping distributional patterns of point-based locations involves limitations including a lack of accuracy, an oversimplification of what is happening on the ground, and an overgeneralization of land use patterns.

Chronological changes and patterns are extremely difficult to portray through GIS. When thinking critically about development and land use policy from an EJ perspective, it is crucial to consider the social vulnerability of local communities at the time of (1) the permit approval, (2) development, and (3) the full duration of time that specific land use is impacting surrounding communities. The CDC's definition of social vulnerability takes socioeconomic status,

63 Gregory, 2002

household composition and disability, minority status and language, and housing and transportation into account.[64] In order to represent social vulnerability on a map, the above data can be used to assign a numerical social vulnerability value to each block group. This number is then used to shade the block groups different colors - each color representing a level of social vulnerability in order to visualize each small region's resilience to external stresses on human health. Populations shift over time, so the factors going into social vulnerability for a block group do not remain constant for a specific region. Due to the dynamic nature of populations and demographics, one cannot assume that a current map of social vulnerability represents the historic social vulnerability of a region.

When thinking about who is being impacted or considered in the permitting of different types of development through an EJ framework, demographics are very important. There is no simple way to show change in land use over time on a single map in ArcGIS. In order to illustrate which communities live in which regions, and the shifting demographics of an area, one would need to make a series of maps. From the maps I created showing the distribution of different types of permits it is unclear when each permit was approved, when the development actually happened, and who was living nearby during that period. Ideally, it would have been possible to create maps for each year or five years showing the spatial components of social vulnerability in a layer created with American Community Survey census data from each 5-year mark since the inception of BCDC. I would then be able to map the permits from each five year time period on top of social vulnerability data specific to that period of time. However, it would

[64] Flanagan, 2011

take an extremely large amount of time to manipulate the census data to create a social vulnerability layer for every 5-year period to match the permits approved during that timespan.

Another question that is difficult to answer through related to visualising shifts over time is whether highly socially vulnerable people moved to areas highly concentrated with toxic industry; or visa versa.[65] There is no way to tell from this project whether different development projects happened before communities with high social vulnerability moved to the regions, or whether communities with high social vulnerability lived in these locations before development projects associated with positive or negative community health impacts were planned and executed. As mentioned earlier, BCDC has no say over which permits are submitted to which locations. This project was meant to gather information to inform BCDC of patterns of permitting history and explore ways to actively promote equity in their policy and permitting processes. I was not attempting to prove any type of discriminatory intent with these maps, rather to look into histories of environmental justice for the purpose of recognizing inequities in hopes that the gaps in land use policy processes that have resulted in permitting inequities that continue to disproportionately harm the health of socially vulnerable communities be addressed.

IX. Thesis Conclusions

The results from this mapping project exemplify how tools such as GIS can be utilized to critically examine patterns of land use and speculate about the distribution of community health impacts resulting from different types of land use from digestible, visually potent maps. Analysis, shown below in **Chart 1**, of the major permit distribution maps strongly supports the

[65] Holifield, et al., 2009

claim that highly socially vulnerable communities bear disproportionate environmental burdens while lacking equal access to land-use related environmental benefits.

	ART Identified Most Vulnerable Communities	AIMVC + 1-mile buffer zone around AIMVC	Remaining BCDC Jurisdiction
Permits associated with negative community health impacts	30	76	60
Permits associated with positive community health impacts	18	18	139

The limitations in accuracy, precision, and thoroughness that come with the use of such highly technical mapping tools were present in this research, but the results are still highly significant. These tools should continue to be used as aids in environmental justice efforts and studies, but the knowledge and personal experiences of impacted communities who are all too familiar with the ins and outs of the physical spaces in question, as well as the nature of the harm being done, must remain paramount. Environmental injustice is complex, and cannot be simplified into a handful of maps and statistical studies, or even a short collection of interviews. Although such measures cannot be seen as conclusive evidence of injustice on their own, the combination of stories told by affected individuals, communities experiencing environmental injustice, and imagery and numbers created by technical tools all together provide convincing proof that patterns of disproportionately low environmental benefits, and disproportionately high environmental costs being placed on socially vulnerable communities do exist. Addressing the history of environmental injustices, and lack of environmental benefits for socially vulnerable communities in the U.S. is necessary, but the promotion of equity in land use policy must be

approached strategically as to ensure that environmental improvements do not result in widespread displacement.

As the demand for housing all around the Bay Area skyrockets, areas that have historically been disproportionately burdened by land use-related community health impacts and have lacked access to environmental benefits such as large, high-quality green spaces are being scouted as investment opportunities for types of development associated with positive community health impacts. For example, upscale residential development with gardens and flowerbeds lining the sidewalks, and expensive health food stores have begun to emerge in many parts of the Bay that were previously considered . As this type of development sprouts up, the cost of housing and the cost of living is rising dramatically, and families who have lived there for generations are forced out.

Gentrification is happening quickly and mercilessly around the Bay, and the ever-increasing financial incentive to invest in areas previously considered undesirable is compounding historic environmental injustices. It is going to take a lot of effort from all levels of government to put policies in place to not only promote social equity and prevent environmental injustice, but to ensure that the improvements in quality of life and community health that result from efforts to balance the distribution of environmental costs and burdens are felt by marginalized communities. In short, land uses associated with positive community health benefits are becoming more widespread, but the communities of color and low-income communities are being pushed out of their neighborhoods so that groups of wealthy, white newcomers can enjoy the benefits. Rent control is a contentious topic in the Bay Area, but without strong protections for renters, complete gentrification is inevitable.

Thus, the push for land use-related environmental justice needs to include efforts from all parties responsible for making decisions around land use planning, permitting, and enforcement. Taking responsibility for past EJ wrongdoings, and working side by side with impacted communities to right those wrongs and ensure that future development, conservation, and other land use projects are carried out in a socially equitable manner is an integral part of the path to EJ.

X. Appendix

a. Images
    i. Image 1: Historic Maps of Redlining Compared to Modern-day Air Quality Measures, Page 5
    ii. Image 2: BCDC Permit File, Page 20
    iii. Image 3: Satellite Image of Port, Page 36
b. Maps
    i. Map 1: ART identified most socially vulnerable communities, Page 22
    ii. Map 2: Major Industrial Permits, Page 25
    iii. Map 3: Fuel Pipelines, Page 26
    iv. Map 4: Industrial Development, Page 27
    v. Map 5: Oil and Gas, Page 27
    vi. Map 6: Port, Page 28
    vii. Map 7: Wastewater Treatment and Outfalls, Page 28
    viii. Map 8: Wharfs, Page 29
    ix. Map 9: Flood Control, Page 29
    x. Map 10: Ecological Restoration, Page 30
    xi. Map 11: Shoreline Protection, Pg. 30
    xii. Map 12: Combined Permits Associated with Negative Community Health Impacts, Pg. 31
    xiii. Map 13: Combined Permits Associated with Positive Community Health Impacts, Pg. 33
c. Graphs
    i. Graph 1: Distributional Breakdown of Permit Type Groups Associated With Negative Community Health Impacts, Page 32
    ii. Graph 2: Distributional Breakdown of Permit Type Groups Associated With Positive Community Health Impacts, Page 34

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