

This map displays environmental justice (EJ) grants the US Environmental Protection Agency (EPA) awarded under the Inflation Reduction Act and other Congressional Appropriations that the EPA Administrator [intends to cancel](#). Grant recipients have already [lost access to funds](#), received notices of termination, or find themselves uncertain of their status.

WHY QUANTIFY ENVIRONMENTAL JUSTICE?



Teaching Data, Power, and Equity

USSEE Workshop

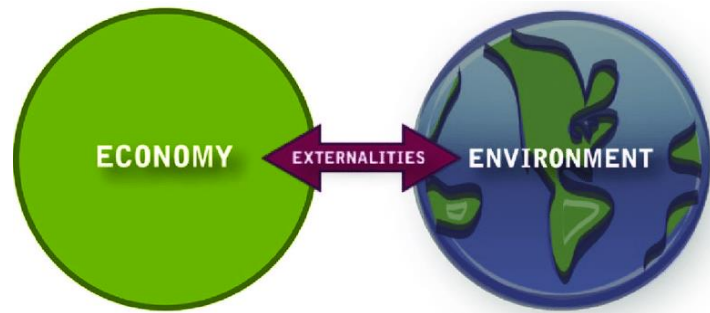
Ashley Lowe Mackenzie

University of Hawaii at Manoa



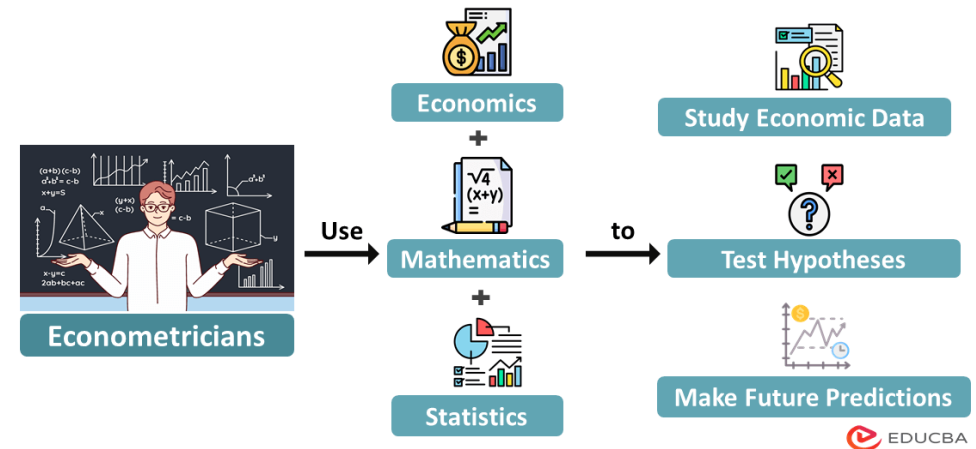
Classroom Framing

Environmental Economics



Empirical studies economic effects of environmental policies, including costs/benefits of policies to deal with air pollution, water quality, toxic substances, solid waste, and global warming

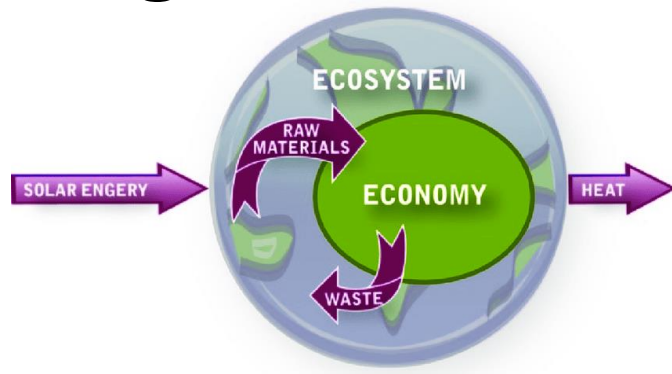
Econometrics



Statistic and Econometrics are powerful tool to see how the economic theory holds up with real data providing a point estimate

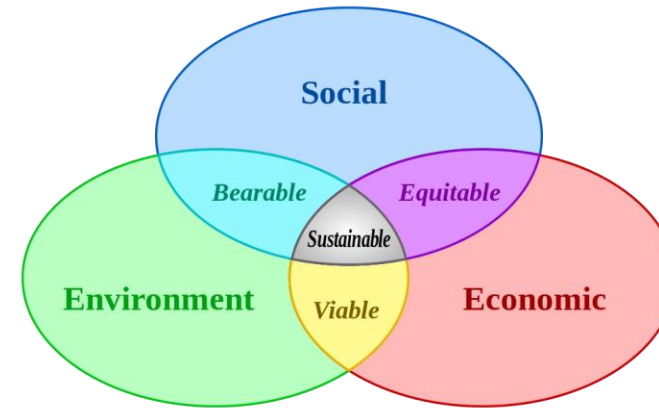
Classroom Framing

Ecological Economics



Treats economy as a subsystem of Earth's larger ecosystem, and by emphasizing the preservation of natural capital/biosphere limitation

Social Environmental Economics



Framing the class with interconnected links between social policy, economics and environmental outcomes



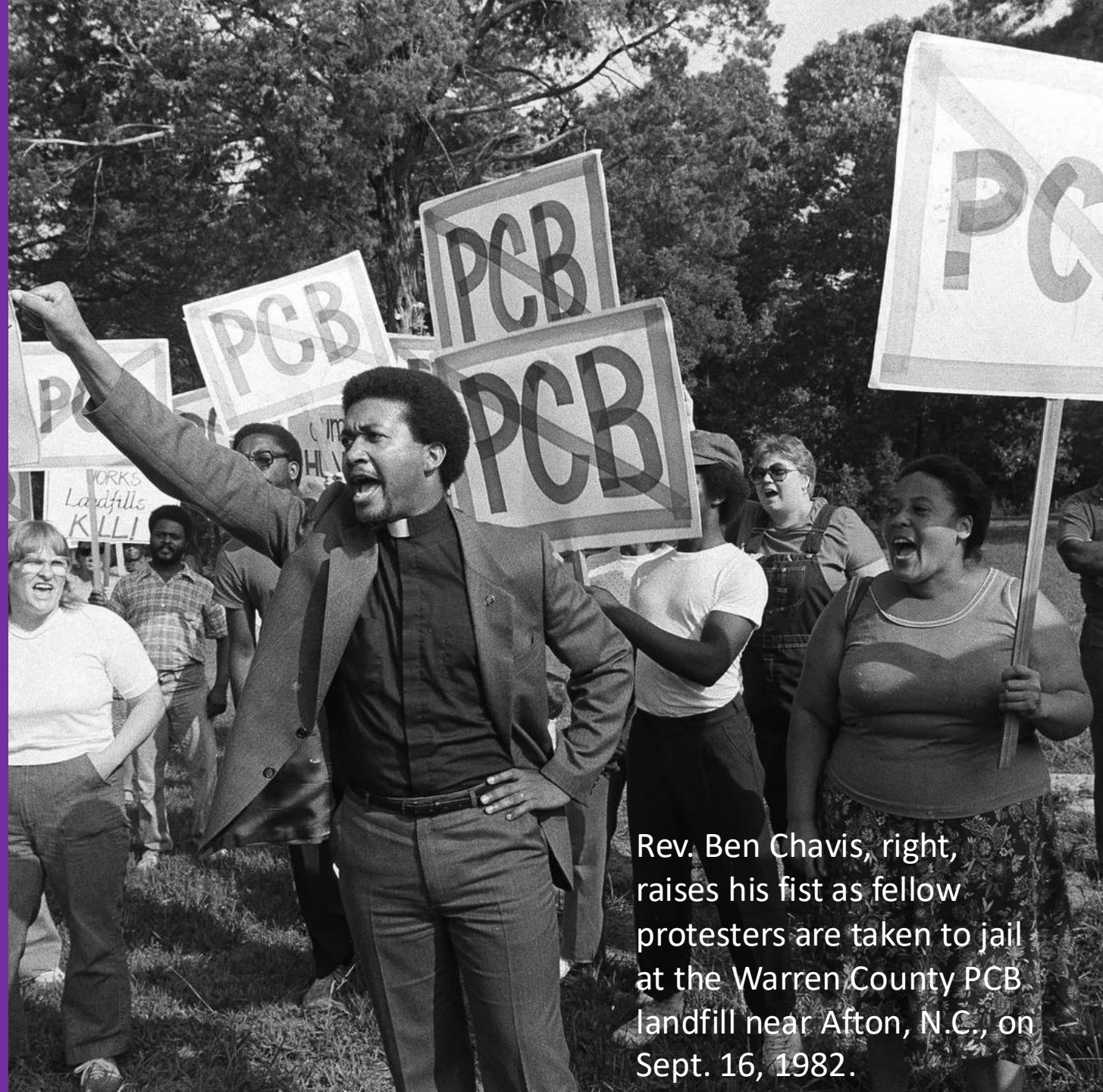
Building Framework w/ Quantitative Focus (Pedagogical Strategy)

Research Project Either Group or Individual

| Step | Task | Teaching Goal |
|---|--|---|
| 1. Define Scope & Decision Makers (Week 1-2) | Pick a local, region, population, or issue, Identifying communities impacted | Center justice in a real-world, place-based context. Who is included? Build Decision maker Matrix |
| 2. Performance Metrics (Week 3-4) | Environmental (PM2.5, proximity to polluter, water quality), Social/economic (e.g., income, race, tribal land) | Unpack assumptions: what “counts” as harm or vulnerability? What does the number mean? |
| 3. Data (Week 5) | Assign students to find datasets: EPA, ACS, community science, mobile data, state | Exploring data analytics |
| 4. Identification/Weights (Week 6-7) | Structured Decision Making: priority/value weighting, expert elicitation | Show how weighting reflects justice trade-offs |
| 5. Build Model (Week 7-8) | Use Excel or GIS, expert elicitation, value to build a simple additive or weighted index | Practice applied skills |
| 6. Reflect Present (Final) | Present: what did your index capture and what did it miss? | Reinforce critical thinking about measurement ethics |

EXAMPLE EJ

Provide Historical Context, policy example, incorporating social, economic, environmental impacts



Rev. Ben Chavis, right, raises his fist as fellow protesters are taken to jail at the Warren County PCB landfill near Afton, N.C., on Sept. 16, 1982.



Background in Environmental Justice Movement

Pre-1976 : Companies could produce polychlorinated biphenyls (PCBs)

PCBs found to be toxicity and could impact health & environment.

1976: US passes Toxic Substances Control Act regulates/banned PCBs





Traditional Economics

Pre TSCA Profit Maximization:

$$\pi = R - C$$

Where π is profits R is revenue, C is cost of production

➤ Companies new cost post regulation

- Dispose of PCBs cost money

$$\pi = TR - (C + R)$$

Where R is regulatory cost of disposing PCBs





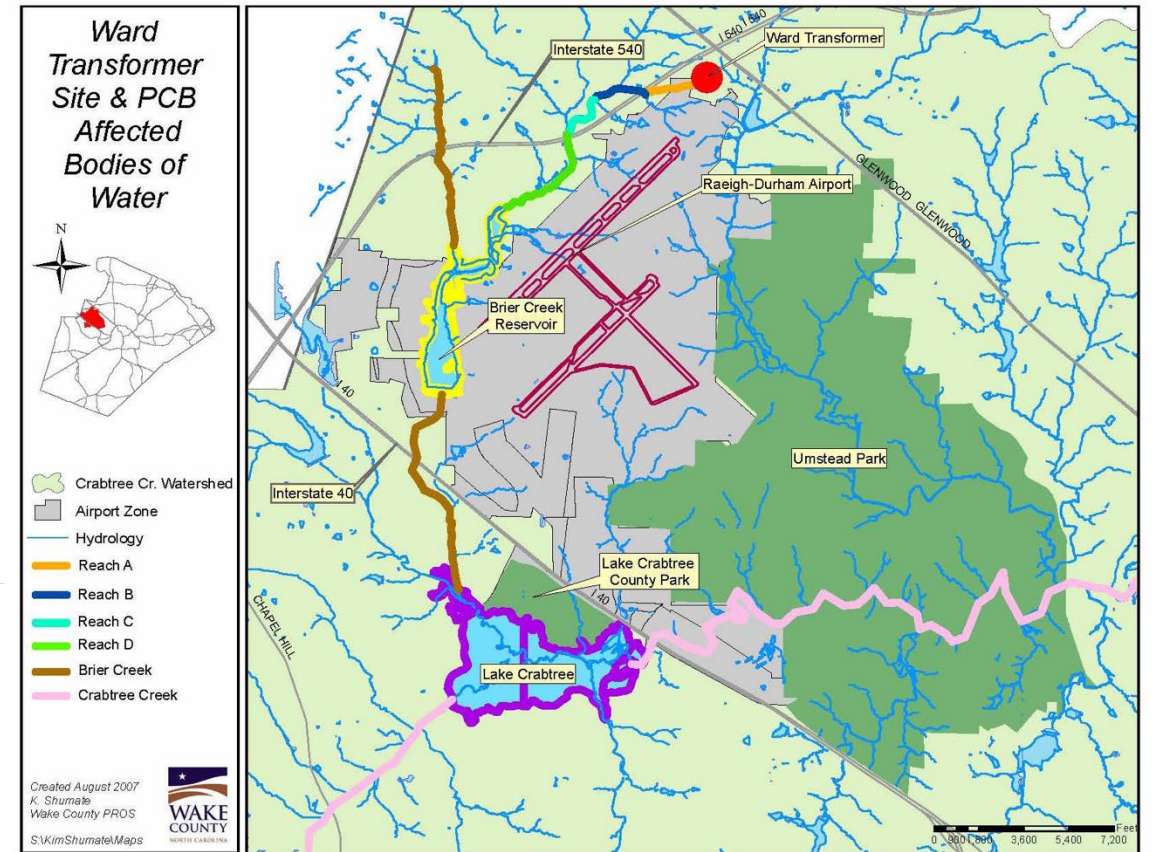
BACKGROUND IN EJ MOVEMENT

Ward Transformer Company

- if they illegal dump and don't get caught $R=0$

But where?

1. Fort Braggs impact range— poor absorption & too sandy for truck
2. Rural roads along 14 counties in North Carolina

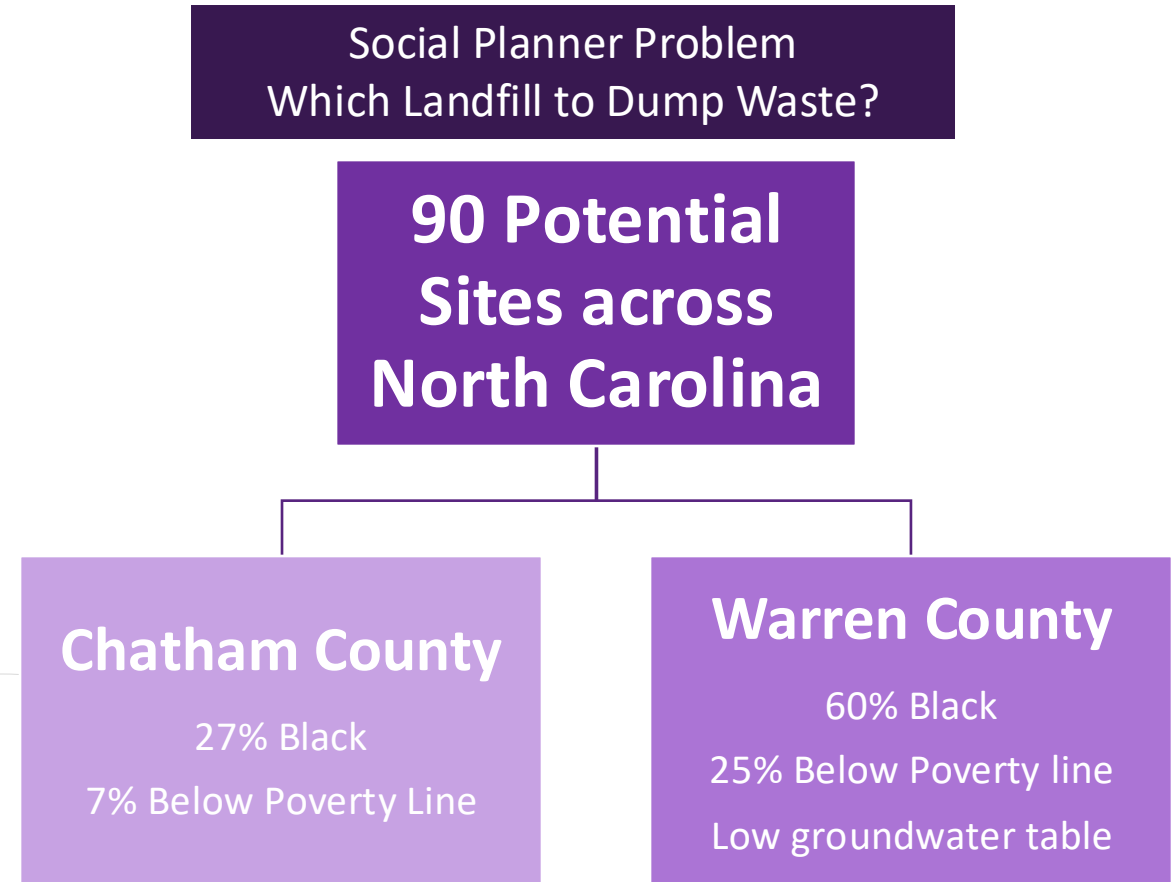




BACKGROUND IN ENVIRONMENTAL JUSTICE

14 Counties reported oily substance sprayed along NC Highway 58 (1978) leading to:

- Prosecuted Ward Transformer (jail time)
 - Created new **social** problem:
 - Gather contaminated soil & proper disposal.
- Who did they choose?



Environmental Justice Movement

- Warren County
- 6-week, non-violent protest laying down in front of dump trucks.
 - 550 Arrests
 - 1st arrest in nation of protestors in the act of stopping pollution



NC Highways
Historical Marker
for PCB landfill
protests in Afton,
North Carolina –
Creative
Commons

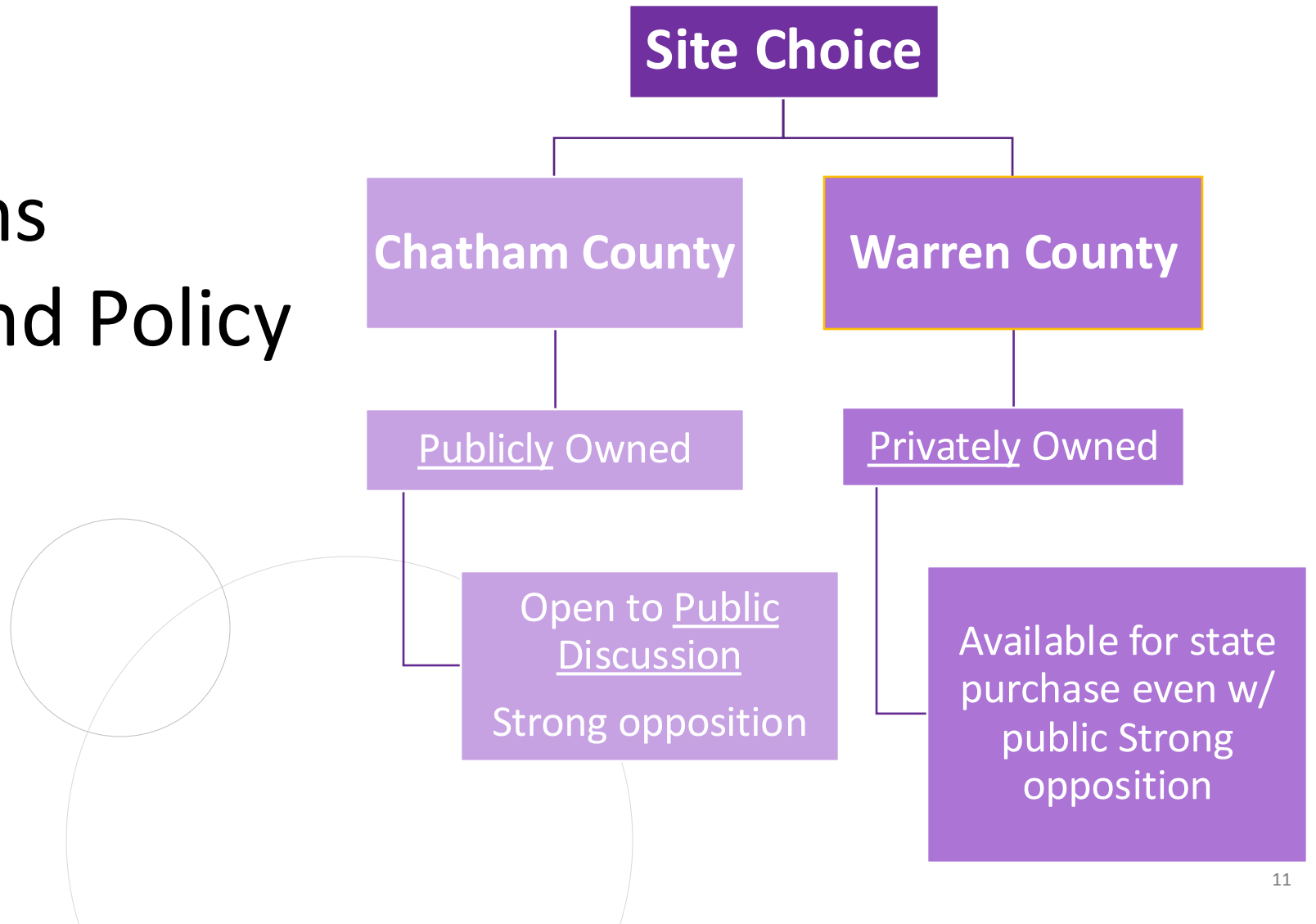


Environmental
justice: protests
against dumping
PCB contaminated
soil in an African-
American
community,
Warren County,
North Carolina,
1982. Source:
Jenny Labalme,
1987



Explore Drivers:

- Demographics
- Economic systems
- Governmental and Policy objectives.



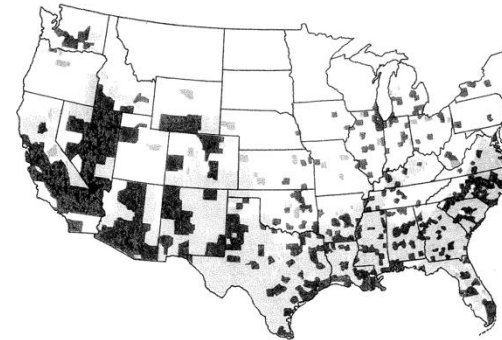
ENVIRONMENTAL JUSTICE MOVEMENT

Spawned research evidence-based environmental hazards & social-economic indicators.

- Across disciplines law, sociology, public policy, geoscience and **economics**
- Robust Correlation between hazards and soci-economic indicators

TOXIC WASTES AND RACE In The United States

A National Report on the Racial and Socio-Economic
Characteristics of Communities
with Hazardous Waste Sites



COMMISSION FOR RACIAL JUSTICE

Chavis and Lee 1987

General Accounting Office

Siting Of Hazardous Waste Landfills And Their Correlation With Racial And Economic Status Of Surrounding Communities

This report provides information on the racial and economic characteristics of communities surrounding four hazardous waste landfills in three southeastern States. It also describes Federal criteria for siting landfills and provides data on public participation and how the Environmental Protection Agency's (EPA's) proposed hazardous waste facility permit changes will affect it.

GAO 1983



What is Environmental Justice?



United States
Environmental Protection
Agency

Federal Activities
(2251A)

April 1998

Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses

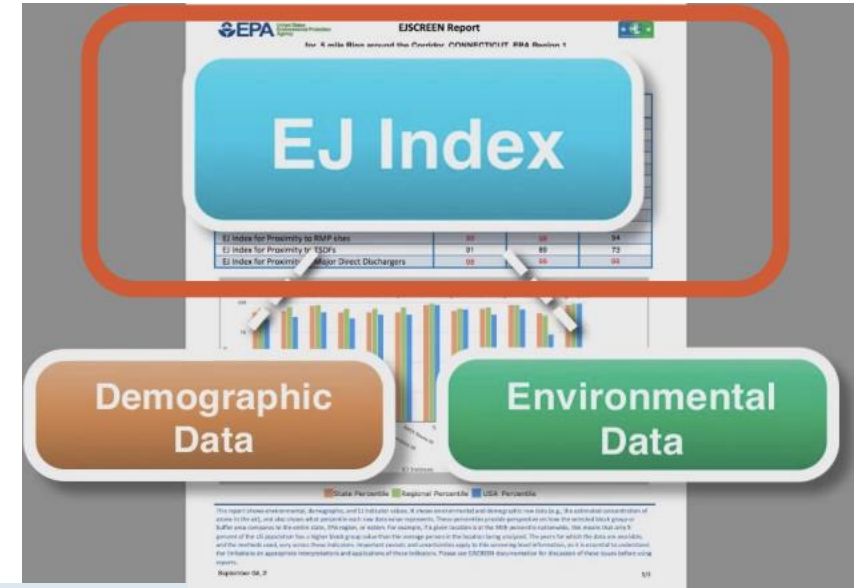
May 2018

EPA defined (1998):

"fair treatment and meaningful involvement of **all people** regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that **no group of people**, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

EPA Created EJ Screen – Environmental Justice Tool

Indexes helps identify areas that may have higher pollution burdens and vulnerable populations present



$$\text{EJ Index} = \text{Environmental Indicator Percentile} \times \text{Demographic Index (Standardized using z scores)}$$

Where $z = \frac{x - \mu}{\sigma}$ where x is value of block μ is mean and σ is the standard deviations



EJ Indexes to Identify Community

- Environmental (13 indicators)
- Socioeconomic (7 indicators)
- 13 EJ Indexes
- 13 Supplemental Indexes
- Health (5 indicators)
- Climate (5 indicators)
- Critical Service Gaps (5 indicators)

| EJ Indexes | Lower 48 | Alaska | Hawaii | |
|-------------------------------------|----------|--------|--------|--|
| PM 2.5 | Yes | No | No | |
| Ozone | Yes | No | No | |
| Nitrogen Dioxide (NO ₂) | Yes | Yes | Yes | |
| Diesel Particulate Matter | Yes | No | Yes | |
| Toxic Releases to Air | Yes | Yes | Yes | |
| Traffic Proximity | Yes | Yes | Yes | |
| Lead Paint | Yes | Yes | Yes | |
| Superfund Proximity | Yes | Yes | Yes | |
| RMP Facility Proximity | Yes | Yes | Yes | |
| Hazardous Waste Proximity | Yes | Yes | Yes | |
| Underground Storage Tanks | Yes | Yes | Yes | |
| Wastewater Discharge | Yes | No | Yes | |
| Drinking Water Non-Compliance | Yes | Yes | Yes | |

COMMON SENTIMENT

I run into when teaching
quantitative analysis with
students in interdisciplinary
department with many
natural science students





Why quantify it? – Students sometimes hesitant to quantify

1. Reveal Systemic Inequities
2. Inform Policy and Target Resources
3. Enable Legal and Regulatory Action
4. Track Progress (adaptive management)



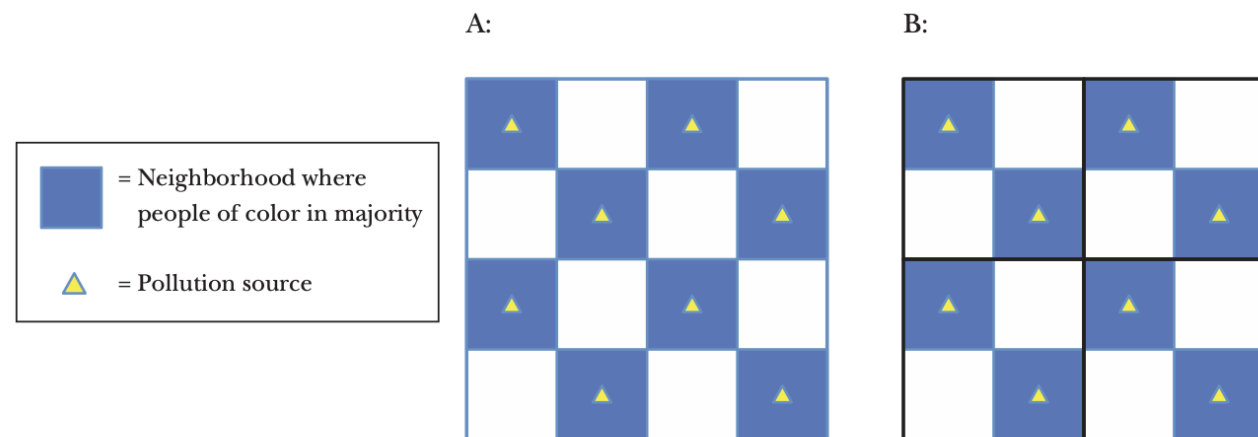


ONE MY MAIN CONCERNS

Space & Time largest conceptual challenges we face in human understanding.

- Census block, tract, zip, grid
- Exposure, risk, vulnerability.
- Temporal mismatch pitfalls.

Figure 4
The Ecological Fallacy



Banzhaf et al 2019 <https://doi.org/10.1257/jep.33.1.185>

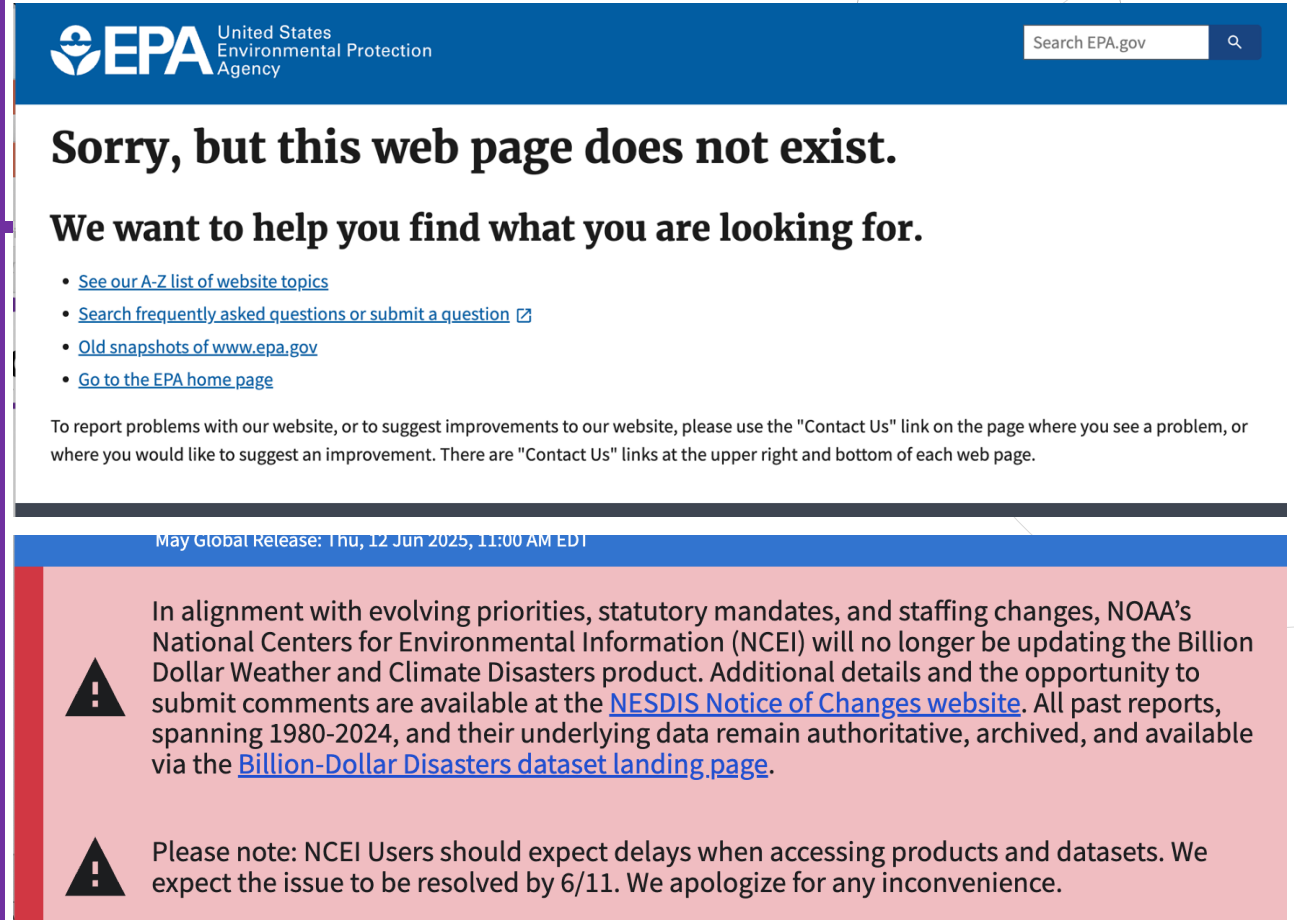
INTERPRETING “THE NUMBER”

- Numeric result \neq lived experience.
- Cumulative impacts (historical)
- Intersectionality lens
- Statistical significance vs. practical significance



TEACHING TOOLS

Data sources in uncertain times.



The screenshot shows the top of an EPA website with the logo and a search bar. Below the header, a large black text block states: "Sorry, but this web page does not exist. We want to help you find what you are looking for." This is followed by a list of four links: "See our A-Z list of website topics", "Search frequently asked questions or submit a question", "Old snapshots of www.epa.gov", and "Go to the EPA home page". A paragraph below these links explains how to report website problems. At the bottom, a blue banner reads "May Global Release: Thu, 12 Jun 2025, 11:00 AM EDT". Below this is a red-bordered box containing two messages, each preceded by a warning triangle icon. The first message is about NOAA's NCEI discontinuing the Billion Dollar Weather and Climate Disasters product. The second message is a note about potential delays in accessing products and datasets.

EPA United States Environmental Protection Agency

Search EPA.gov

Sorry, but this web page does not exist.

We want to help you find what you are looking for.

- [See our A-Z list of website topics](#)
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To report problems with our website, or to suggest improvements to our website, please use the "Contact Us" link on the page where you see a problem, or where you would like to suggest an improvement. There are "Contact Us" links at the upper right and bottom of each web page.

May Global Release: Thu, 12 Jun 2025, 11:00 AM EDT

! In alignment with evolving priorities, statutory mandates, and staffing changes, NOAA's National Centers for Environmental Information (NCEI) will no longer be updating the Billion Dollar Weather and Climate Disasters product. Additional details and the opportunity to submit comments are available at the [NESDIS Notice of Changes website](#). All past reports, spanning 1980-2024, and their underlying data remain authoritative, archived, and available via the [Billion-Dollar Disasters dataset landing page](#).

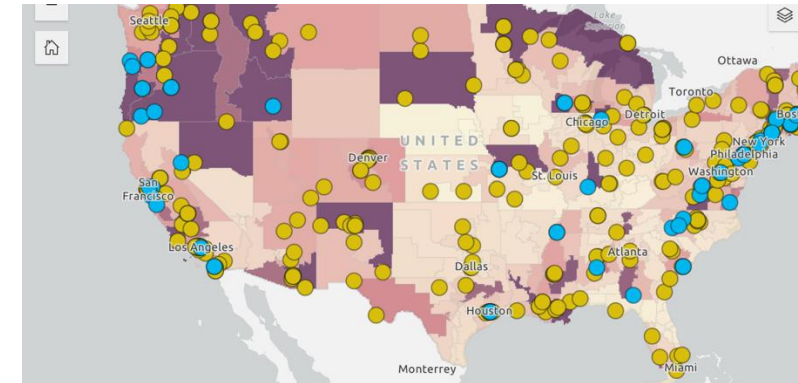
! Please note: NCEI Users should expect delays when accessing products and datasets. We expect the issue to be resolved by 6/11. We apologize for any inconvenience.

CURRENT CONTEXT

- Executive Orders ending EO 12898 (1994), 14096 (2023), etc.
- Closed U.S. EPA's Office of EJ in all 10 regions
- Federal rollbacks/layoffs
- Data disappearing
- Grants frozen



By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered:



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DIVE BRIEF

EPA to end environmental justice programs, monitoring tools

Under the Trump administration, the waste industry no longer has access to EJScreen, a monitoring tool used to track environmental justice metrics near facilities.

Published March 13, 2025

Megan Quinn
Senior Reporter

in f x p e





CURRENT 4. DATA SOURCE HUNT

Alternative repositories:

- CEQ Climate & Economic Justice Screening Tool
- Environmental Data & Governance Initiative
- State EJ portals (example CalEnviroScreen).

Strategies: open-source data, community science, FOIA

- Teach students adaptive approaches to navigate uncertainty and incomplete data
- Crowdsourced & satellite data (NO₂, PM_{2.5}).
PurpleAir

Database

Data + Screening Tools

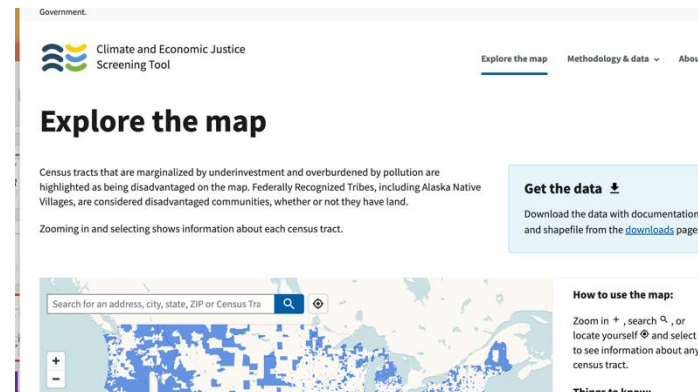
[Data & Tools](#) [Get Involved](#) [About](#) [News](#) [Donat](#)

This is an initial reconstruction of Version 2.3 of EPA's EJScreen. Public access to the tool from EPA was discontinued on February 5, 2025. We re-created the tool and made it publicly accessible.

Note: You can identify the EJScreen data and index percentiles for a given block group right now. Check back soon as we put more time and resources toward the functionality of EJScreen you might be used to.

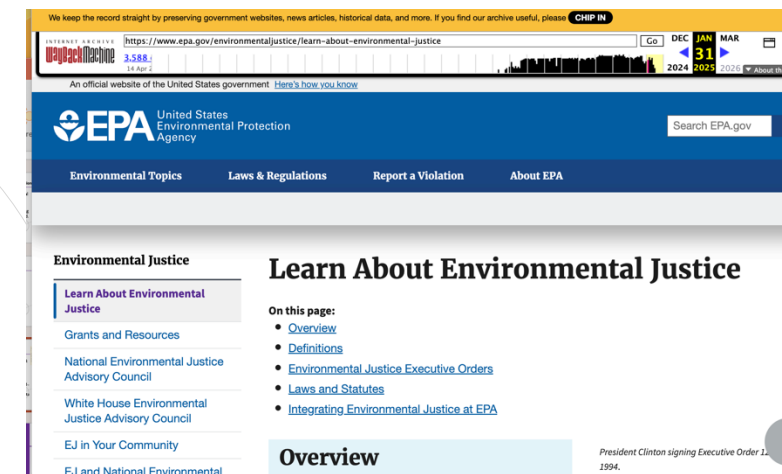
Use the tool here.

- [Underlying data] [Harvard University DataVerse: EPA EJScreen](#)
- [Here is a clone of all EPA GitHub repositories.](#)



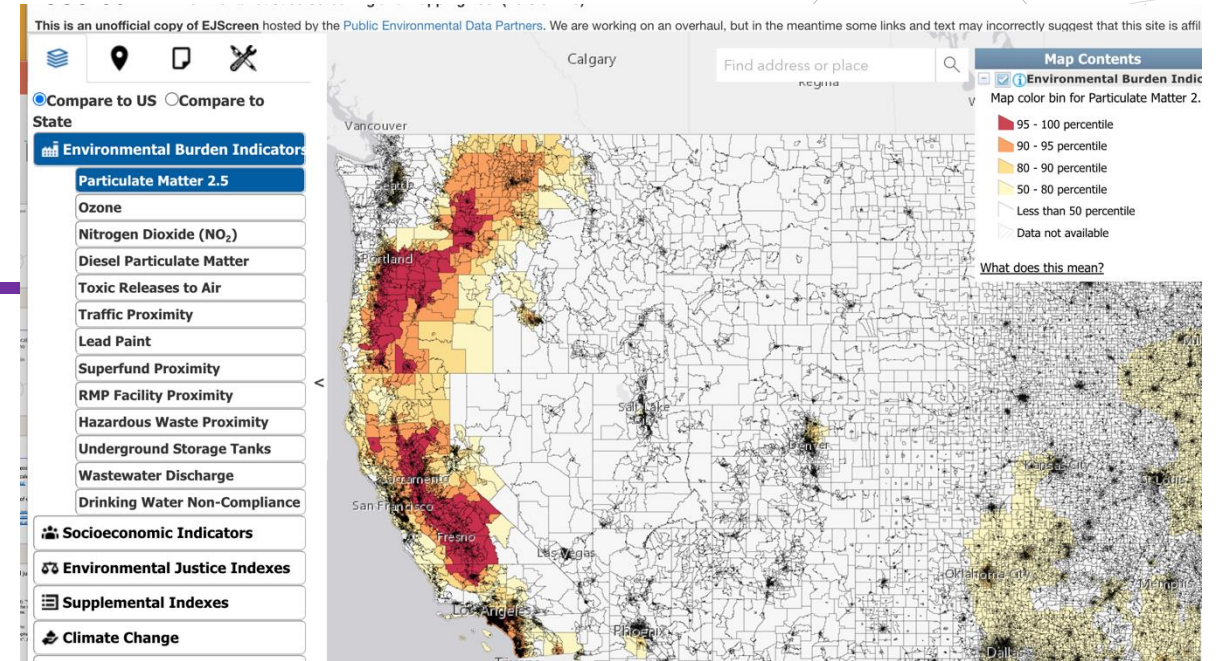
CJEST

Wayback Machine



CASE STUDY MINI-LAB

Small-group/individual task: interpret an EJScreen output tile for a real neighborhood.

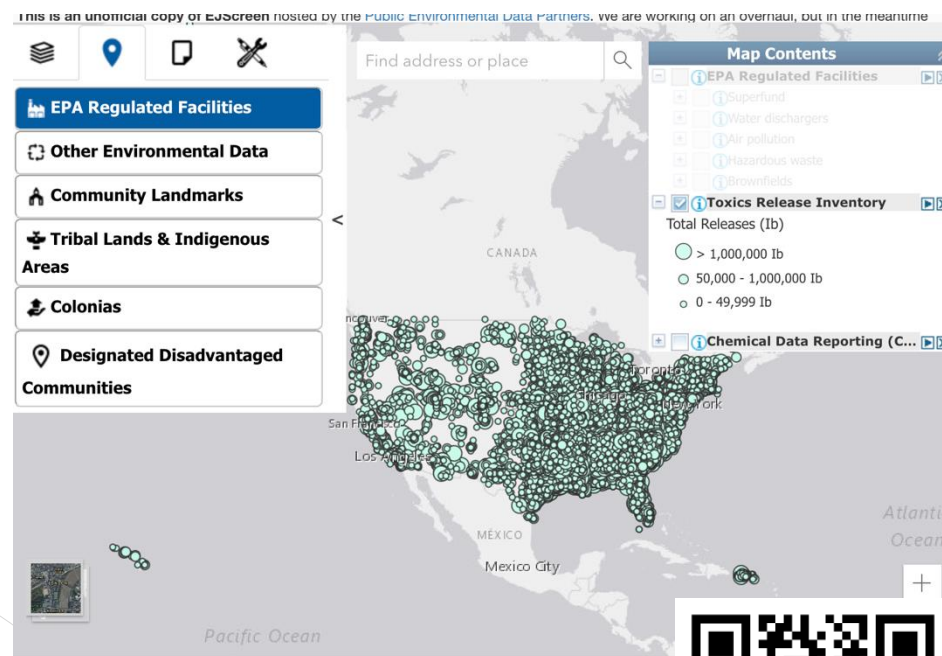




Navigate to your Home County

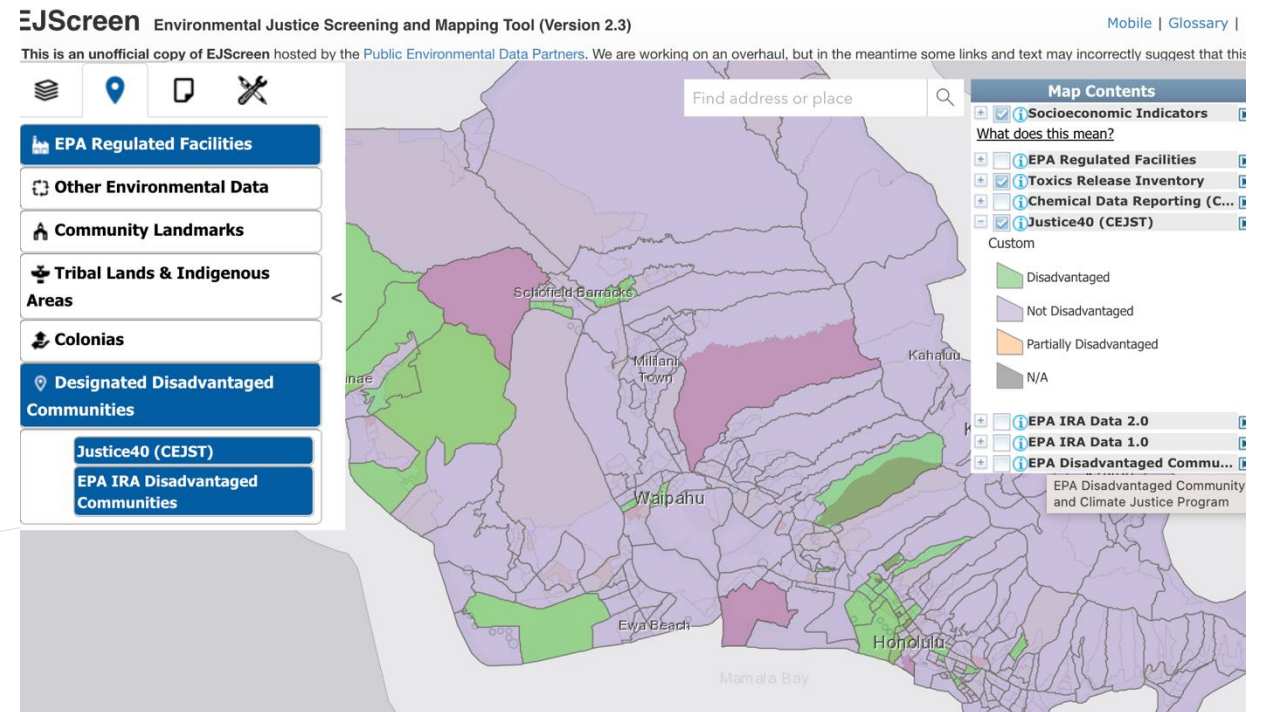
Find your home (childhood or current)

- Add a **Map Social Indicators** : Choose Low Income, People of Color, or Education
 - *Climate Change*: Extreme Heat click on census tract to explore how many days over 90 across years.
- Navigate to **Places** add EPA Regulated Facilities
 - Explore Regulated Facilities
 - Add Toxic Release
 - Designated Disadvantage Communities (Justice40 & EPA IRA)
- Using **Tools** (*Measure*, click *Ruler*) calculate distance to an EPA Regulated Facilities or TRI



REFLECTION QUESTIONS

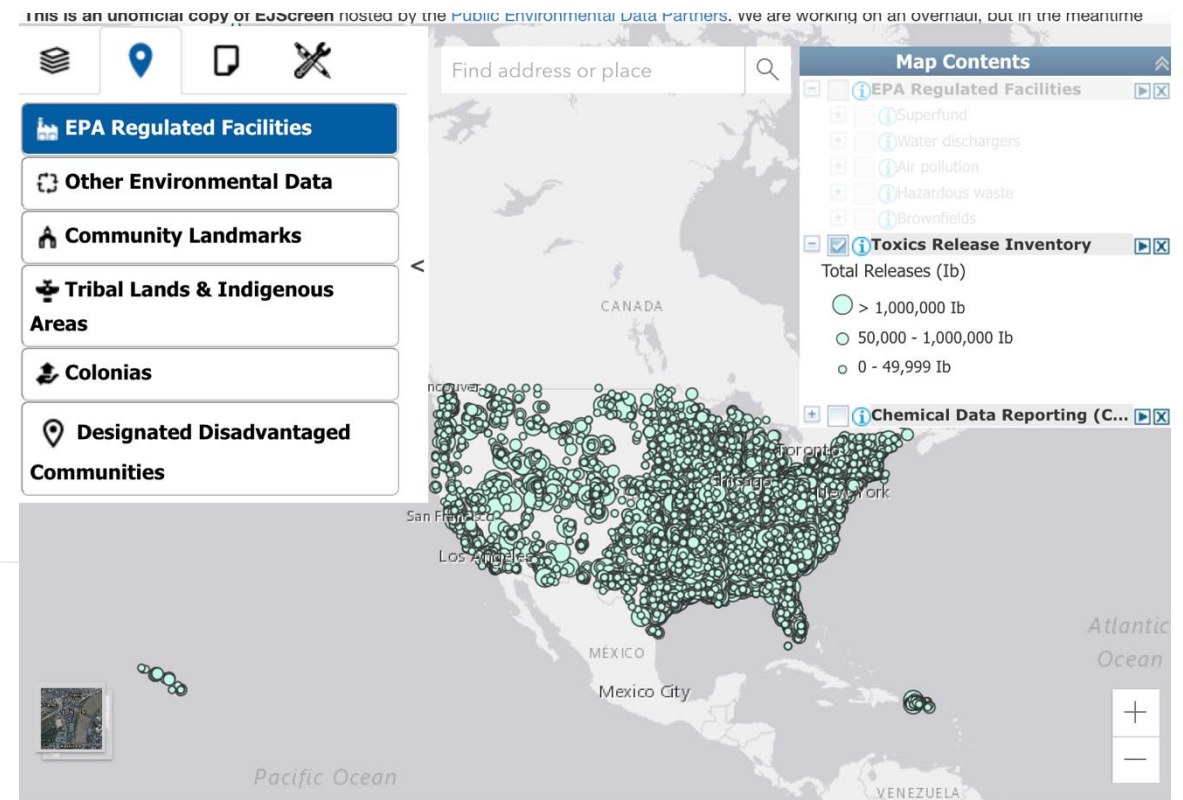
- Does your local knowledge reflect the data shown for disadvantaged communities? (Did Justice40 or EPA EJ Screen)
- Are the scales the same?





REFLECTION QUESTIONS

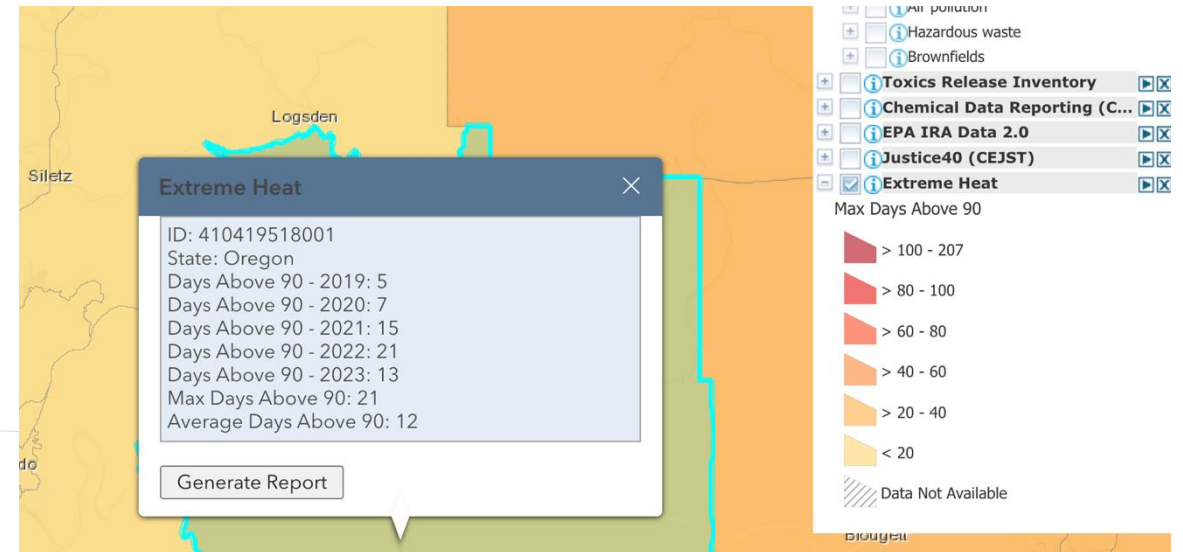
- Was reported hazardous material or TRI closer than you original assumed?





REFLECTION QUESTIONS

- Has the number of days above 90 grown in your area?
- Compare to nearest Disadvantage Community





THANK YOU



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<http://www2.hawaii.edu/~alowemac/>



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