Making Sense of Social Vulnerability Indices and Tools

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Overview

1

What is social vulnerability?

2

Why does social vulnerability matter?

3

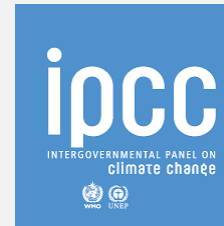**How do we measure vulnerability?**

4

Is there a best tool?

What is social vulnerability?

A few definitions:

"Social vulnerability refers to the potential negative effects on communities caused by external stresses on human health."

"The degree to which a system (social or ecological) is susceptible to or unable to cope with or adapt to effects of climate change and associated hazards"
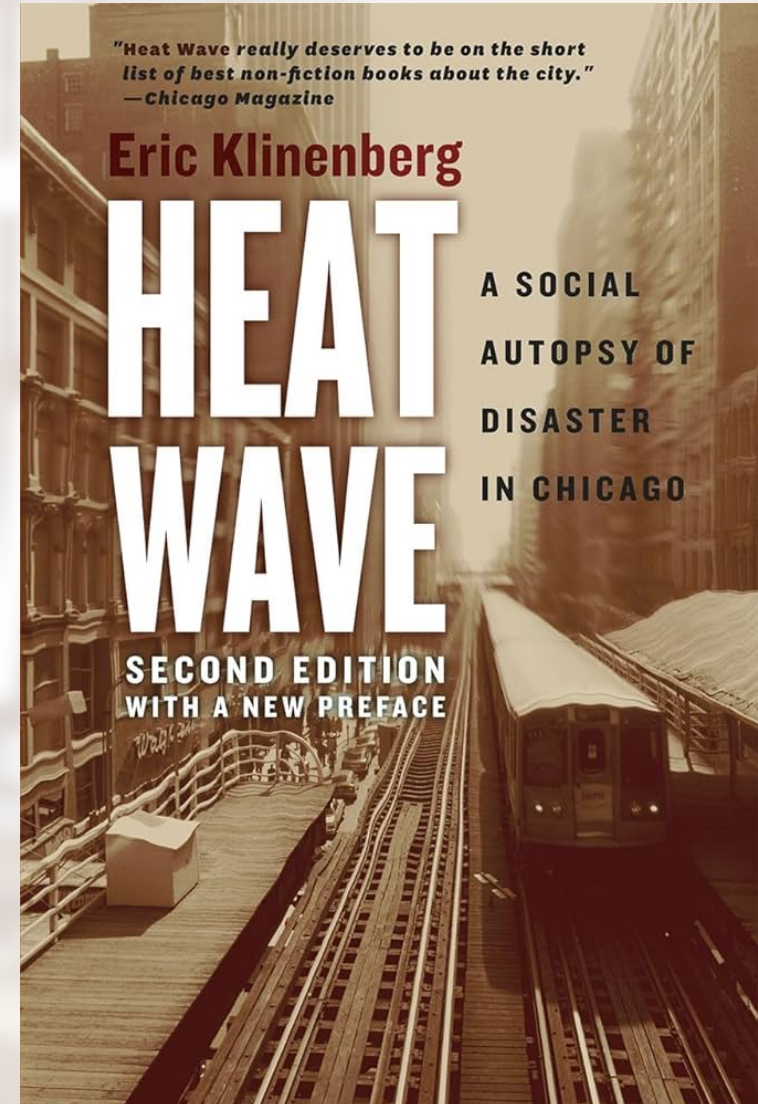
"Social vulnerability is the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood."

"Social vulnerability is defined as the disproportionate susceptibility of some social groups to the impacts of hazards, including death, injury, loss, or disruption of livelihood."

To summarize:

- **We are all subject to environmental risk**
  - Varies depending on physical location
  - Could be short-term or long-term
- Some groups of people are marginalized as a result of **historical and ongoing social and economic forces**
  - This includes direct prejudice and discrimination as well as a variety of policies and regulations with resulting intentional and unintentional consequences

- Otherwise **marginalized people are more vulnerable to harm when faced with environmental challenges**
  - First, when exposed
  - Second, when recovering

- This has been **well established** through robust scholarship.

"Heat Wave really deserves to be on the short list of best non-fiction books about the city."
—Chicago Magazine

Eric Klinenberg

HEAT WAVE

A SOCIAL AUTOPSY OF DISASTER IN CHICAGO

SECOND EDITION
WITH A NEW PREFACE

Why does social vulnerability matter to our work?

Considering social vulnerability in planning and service delivery allows us to better serve our communities

State, federal, and grant funding increasingly requires social vulnerability to be considered.

Even when not required, consideration can increase application competitiveness.

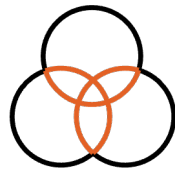# How do we measure social vulnerability?

Create an index

Composite statistic that allows us to simultaneously consider multiple variables

Variables are tied to geographies

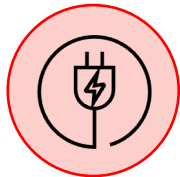Allows for meaningful comparison between geographies.

Federal Social Vulnerability Indices and Tools*

Social Vulnerability Index (SVI) – Centers for Disease Control and Prevention

Environmental Justice Screening and Mapping Tool (EJ Screen) – Environmental Protection Agency

Energy Justice Mapping Tool / Disadvantaged Communities Reporter – Department of Energy

National Risk Index (NRI) / Resilience Analysis and Planning Tool (RAPT) – Federal Emergency Management Agency

US DOT Equitable Transportation Community (ETC) Explorer – Department of Transportation

Climate and Economic Justice Screening Tool (CEJST) – White House Council on Environmental Quality

This is not a comprehensive list of all available social vulnerability indices and tools

Social Vulnerability Index (SVI) – Centers for Disease Control and Prevention

Purpose: Help public health officials and emergency response planners identify communities that will most likely need support before, during, and after a hazardous event.
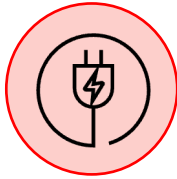
Number of Variables: 16, across 4 categories ("themes")
- Socioeconomic (5)
- Household (5)
- Racial and Ethnic Minority Status (1)
- Housing Type and Transportation (5)

Data Source: US Census Bureau

CDC/ATSDR SVI Themes
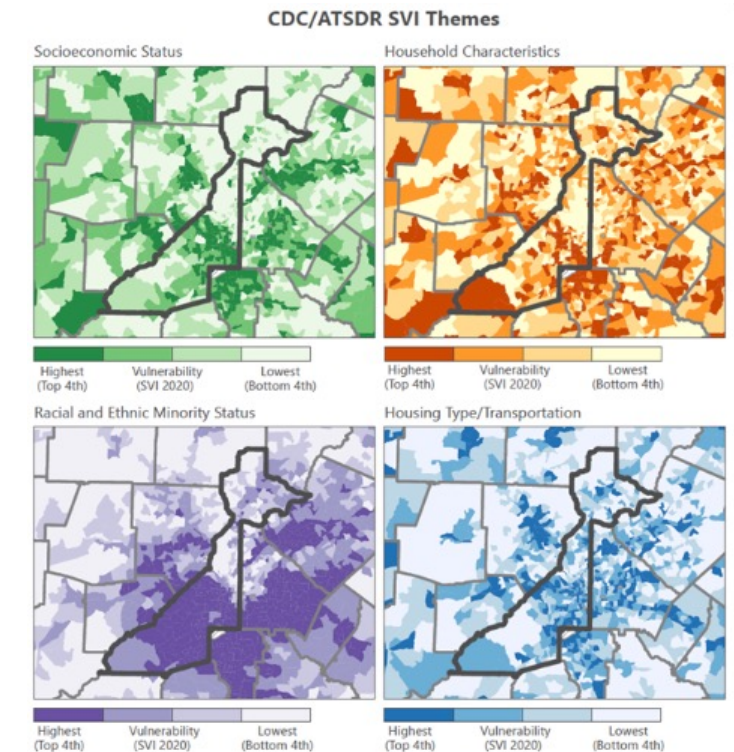
Maps show the range of vulnerability in Fulton County, Georgia for the four themes

Energy Justice Mapping Tool / Disadvantaged Communities Reporter – Department of Energy

Purpose: Help the Department of Energy and related practitioners to implement federal Justice40 efforts.

Number of Variables: 36, across 4 categories

- Fossil Dependence (2)
- Energy Burden (5)
- Environmental and Climate Hazards (10)
- Socio-economic Vulnerabilities (19)

Data Sources:

US Census Bureau
Center for Neighborhood Technology
FEMA National Risk Index
US Department of Commerce National Telecommunications and Information Administration
US EPA EJ Screen
US Department of Energy Low-Income Energy Affordability Data (LEAD)
US Department of Agriculture (USDA) ERS - Food Access Research Atlas
US Department of Housing and Urban Development (HUD)
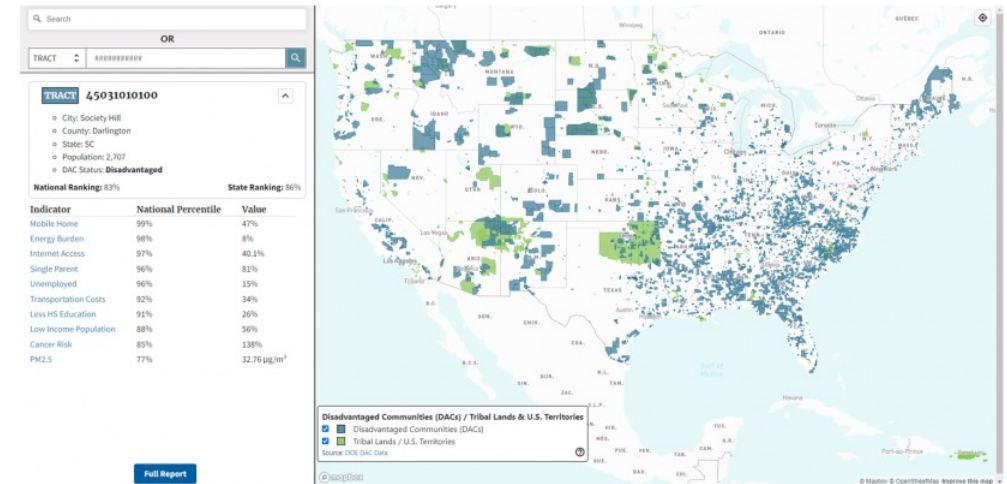
US DOT Equitable Transportation Community (ETC) Explorer– Department of Transportation

Purpose: Assist applicants for funding (and other leaders) to identify whether a project is located in a disadvantaged area.

Number of Variables: 40, across 5 categories

- Transportation Insecurity (3)
- Climate and Disaster Risk Burden (3)
- Environmental Burden (16)
- Health Vulnerability (5)
- Social Vulnerability (13)

Data Sources:
US Census Bureau
Bureau of Labor Statistics (BLS)
Bureau of Transportation Statistics (BTS)
CDC Places
FEMA NRI
FEMA Resilience Analysis and Planning Tool (GINI Index)
US Department of Transportation (DOT)
US EPA EJ Screen
US Geological Survey (USGS) MRLC NLCD Land Cover
NOAA
US Department of Housing and Urban Development (HUD)
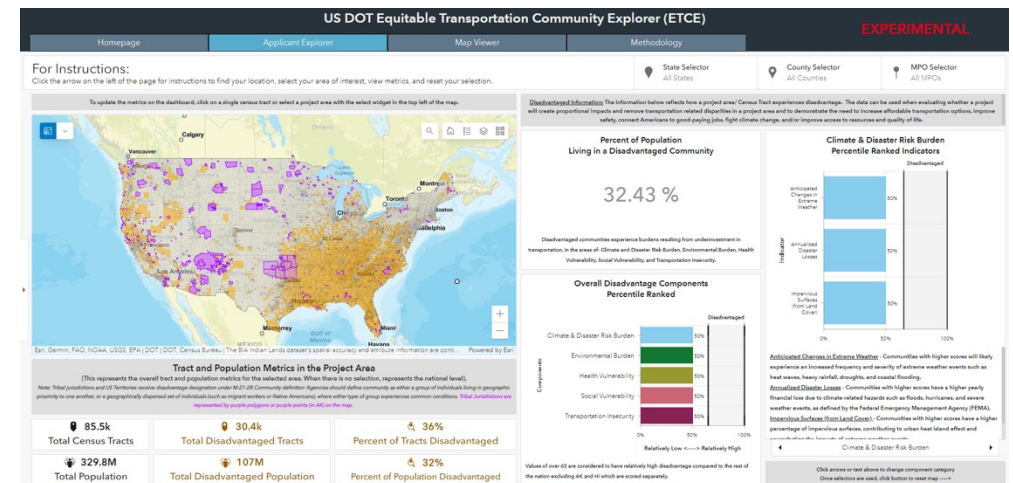
Environmental Justice Screening and Mapping Tool (EJ Screen) – Environmental Protection Agency

Purpose: provides EPA with a nationally consistent dataset and approach for combining environmental and demographic socioeconomic indicators.

Number of Variables: 19, across 2 categories
- Environmental / EJ indicators (12)
- Socioeconomic indicators (7)

Data Sources: US Census Bureau, US Environmental Protection Agency
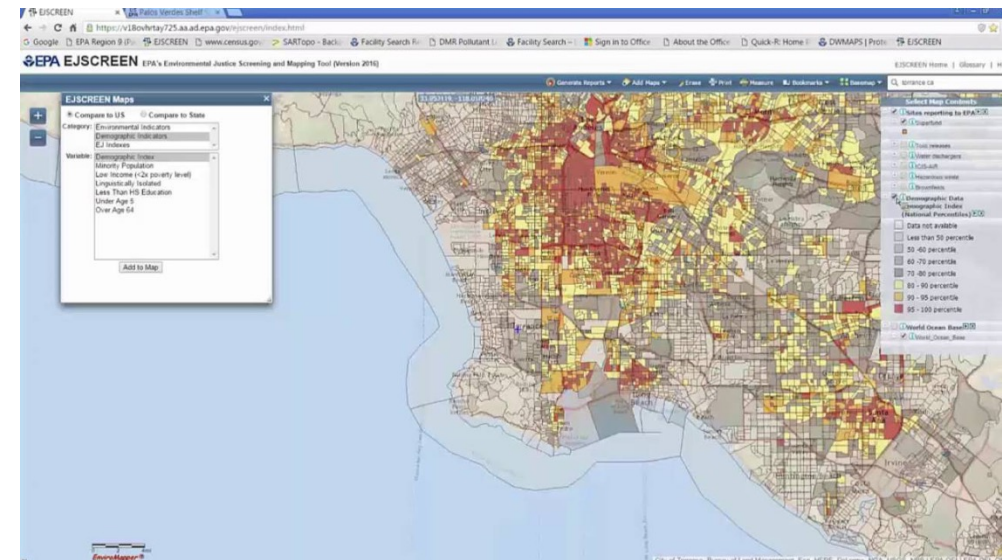
National Risk Index (NRI) / Resilience Analysis and Planning Tool (RAPT) – Federal Emergency Management Agency

Purpose: Illustrate communities most at risk to a variety of natural hazards. **Establish a baseline risk measurement** for each United States county and Census tract including a Community Resilience Score.

Number of Variables: 100 in the context of 18 natural hazards

Data Sources:

US Census Bureau
Bureau of Labor Statistics (BLS)
Bureau of Transportation Statistics (BTS)
CDC SVI
Energy Information Administration
Federal Communications Commission (FCC) Internet Access
FEMA NRI
FEMA Resilience Analysis and Planning Tool (GINI Index)
HVRI Baseline Resilience Indicators for Communities
NOAA

National Weather Service
NEXRAD Real-Time Weather Radar
US DOT
US Army Corps of Engineers (USACE)
USDA Census of Agriculture
US Department of Education (DOEd) NCES
US EPA EJ Screen
US Forest Service Water Supply Stress Index
US HUD
USGS MRLC NLCD Land Cover
USC SHELDUS

Climate and Economic Justice Screening Tool (CEJST) – White House Council on Environmental Quality
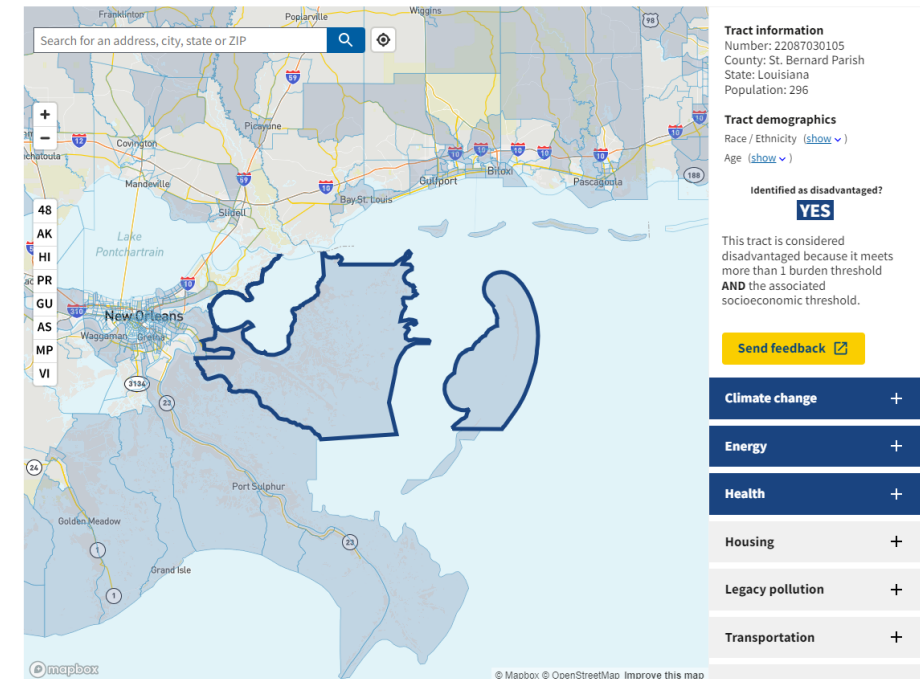
Purpose: Identifies communities that have faced historic injustices and have borne the brunt of pollution with the intent of ensuring these communities are the first to see the benefits of climate action.

Consolidates data and variables from other sources, across 8 categories.

- Climate change, Energy, Health, Housing, Legacy pollution, Transportation, Water and wastewater, Workforce development

Data Sources:

US Census Bureau
Centers for Disease Control and Prevention
FEMA National Risk Index
First Street Foundation Climate Risk Data Access
USACE Formerly Used Defense Sites
US Department of Energy Low-Income Energy Affordability Data (LEAD)
US Department of Interior (DOI) Abandoned Mine Land
US DOT Traffic Data
US Environmental Protection Agency
US Geological Survey (USGS) MRLC NLCD Land Cover
US HUD Housing Affordability Data
National Community Reinvestment Coalition Data

Some states are beginning to develop their own methodologies and tools

Massachusetts 2020 Environmental Justice Populations

Click in any EJ community for details

Find address or place
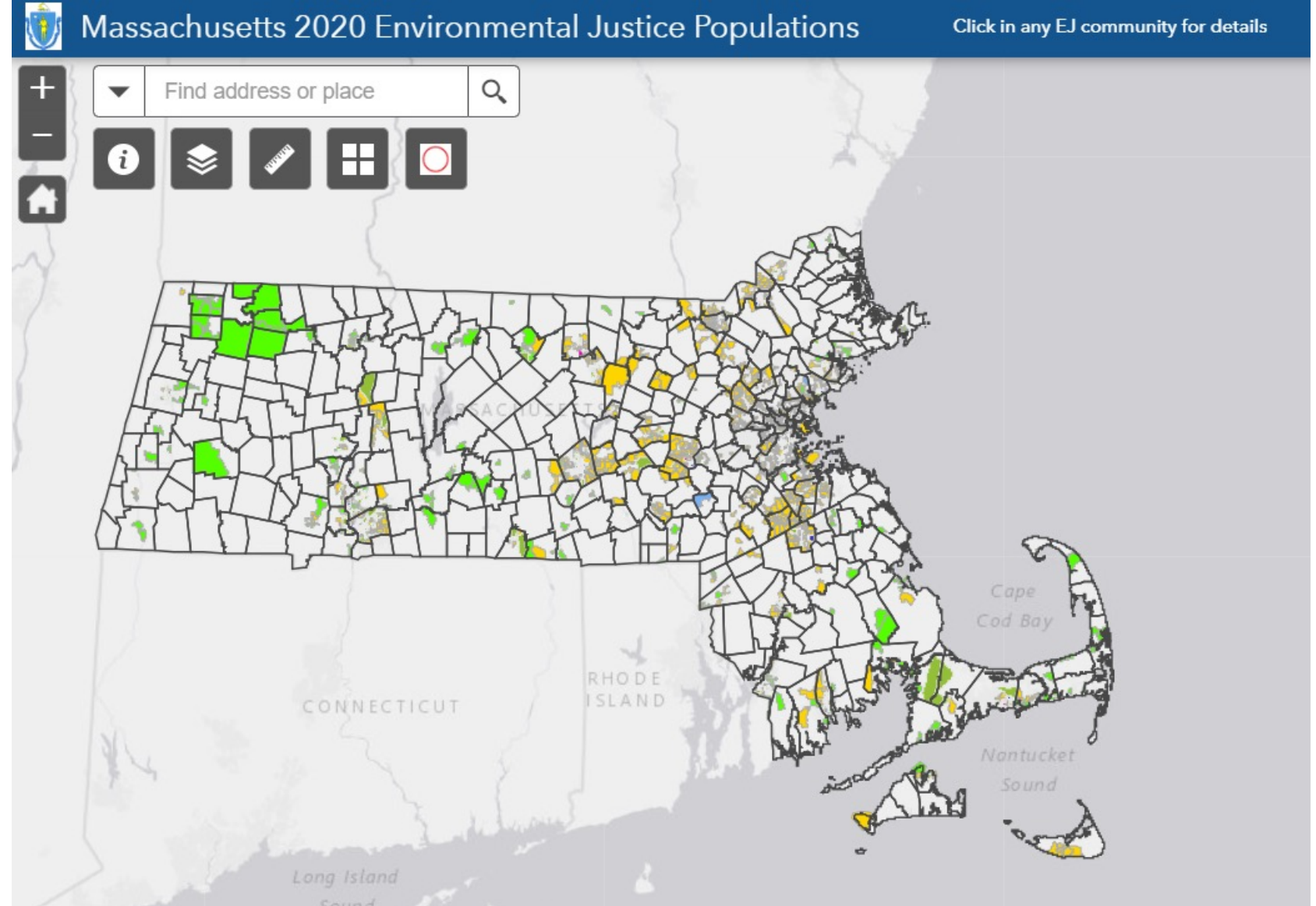
Is there a best tool?

	CDC SVI	DOE Energy Justice	USDOT ETC	EPA EJ Screen	FEMA NRI	CEJEST
Multiple data sources		X	X	X	X	X
Index for comparison between geographies	X	X	X		X	
"Labels" disadvantaged communities*	X		X			X
Incorporates predictive data						X
May be used in pursuing funding	X	X	X	X	X	X

Methodology and terminologyy vary

**More comprehensive matrix available in the appendix.*

Is there a "best" tool?

It largely depends on the intent of use…

- **Are there specific projects or plans to be implemented?**

  - Transportation-related projects may benefit the most from **DOT's ETC Explorer** and **FEMA NRI / RAPT**

  - Planning projects may benefit from significant time and investment in looking through report outs from **CEJST, EJScreen,** and **FEMA NRI** – particularly the environmental, economic, and institutional investment pieces

- **Do you know where your projects are currently located and need to identify the most vulnerable populations?**

  - **DOE Energy Justice Mapping Tool** considers the most household and transportation characteristics

  - **CEJST** considers historic underinvestment and environmental condition impacts

  - **FEMA NRI / RAPT** consider the most socioeconomic and economic resilience indicators

- **Would you like to best identify areas of potential flooding where projects could be implemented?**

  - **CEJST** incorporates third-party flood risk data and takes into account fluvial flooding

  - **FEMA NRI** best captures individual hazard expected annualized losses for buildings, people, and crops

Thank You!

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Appendix

Indicator Matrix

Indicator Matrix	DOE Energy Justice Mapping Tool	DOT Equitable Transportation Community Explorer	EPA Environmental Justice Screening and Mapping Tool	CDC Social Vulnerability Index	FEMA National Risk Index / Resilience Analysis and Planning Tool	WH CEQ Climate and Economic Justice Screening Tool
Racial and Ethnicity			●	●	●	
Percent of individuals who list their racial status as a race other than white alone			●	●	●	
Percentage of individuals who list their ethnicity as Hispanic or Latino			●	●	●	
Housing Type and Transportation	●	●		●	●	
Group Quarters				●	●	
No Vehicle	●	●		●	●	●
Crowding				●	●	
Mobile Homes	●	●		●	●	
Walkability		●				
Multi-Unit Structures				●	●	
>30 min Commute	●	●				
Transportation Costs % Income for the Regional Typical Household	●	●				●
Transportation Barriers		●				●
Transportation Safety		●				
Average Driving Time (Education, Grocery, Medical Facility, Park)		●				
Household Characteristics	●	●	●	●	●	●
Linguistic Isolation / English Language Proficiency	●	●	●	●	●	●
Single-Parent Households	●			●	●	
Aged 17 & Younger		●	●	●	●	
Aged 65 & Older	●	●	●	●	●	
Owner-Occupied / Renter-Occupied	●	●			●	
Lack of Indoor Plumbing	●					●
Lack of Greenspace	●					●
Percent of Housing Units Built Before 1960 (lead paint indicator)	●	●	●			●
Internet Access	●	●			●	
Telephone Service					●	
Non-grid Connected Heating Fuel	●					
Food Desert	●				●	
Health	●	●		●	●	●
Low-life Expectancy						●
Disability	●	●		●	●	●
Heart Disease		●				●
Diabetes		●				●
Asthma		●				●

Indicator Matrix

	DOE Energy Justice Mapping Tool	DOT Equitable Transportation Community Explorer	EPA Environmental Justice Screening and Mapping Tool	CDC Social Vulnerability Index	FEMA National Risk Index / Resilience Analysis and Planning Tool	WH CEQ Climate and Economic Justice Screening Tool
Socioeconomic Status and Conditions	●	●	●	●	●	●
Low Income	●	●	●			●
Poverty		●		●	●	●
Unemployment Rate	●	●	●	●	●	●
Gender Income Equality		●			●	
Less HS Education	●	●	●	●	●	●
Housing Cost Burden	●	●		●	●	●
No Health Insurance	●	●		●	●	
Job Access	●	●			●	
Access to Hospitals / Mental Health Support Facilities		●			●	
Physician Access					●	
Economic Resilience					●	
Non-dependence on Primary/Tourism Sector					●	
Business Size					●	
Federal Employment Percentage					●	
Historic Underinvestment Metric						●
GINI Index		●			●	
Environmental Conditions	●	●	●			●
Wastewater Discharge	●		●			●
Underground Storage Tanks and Releases			●			●
Formerly Used Defense Sites						●
Superfund Proximity	●		●			●
Risk Management Plan Facility Proximity	●		●			●
Hazardous Waste Proximity	●	●	●			●
Abandoned Mine Land						●
Ozone Level in Air		●	●			
PM2.5 Level in Air		●	●			●
Traffic Proximity and Volume	●	●	●			●
Air Toxic Cancer Risk	●	●	●			●
Diesel PM Level in Air	●	●	●			●
Coal Employment	●					
Fossil Energy Employment	●					
Energy Cost Burden	●					●
Electric Outage Events	●					
Electric Outage Duration	●					

Indicator Matrix

	DOE Energy Justice Mapping Tool	DOT Equitable Transportation Community Explorer	EPA Environmental Justice Screening and Mapping Tool	CDC Social Vulnerability Index	FEMA National Risk Index / Resilience Analysis and Planning Tool	WH CEQ Climate and Economic Justice Screening Tool
Institutional Resilience					●	
Mitigation Spending (10-year average)					●	
Flood Insurance Coverage					●	
Crop Insurance Coverage					●	
Jurisdictional Coordination					●	
Infrastructure Indicators - Homeland Infrastructure Foundation-Level Data (Open)					●	
Disaster Aid Experience (# of Presidential disaster declarations)					●	
Local Disaster Training					●	
Proximity to State Capital					●	
Proximity to Nearest MSA					●	
Evacuation Routes – Access to Points of Egress					●	
Local Food Supplies					●	
Natural Hazards Exposure (18 climate hazards)	●	●			●	●
Expected Annual Loss – Population	●	●			●	●
Expected Annual Loss – Buildings	●	●			●	●
Expected Annual Loss – Agriculture	●	●			●	●
Annualized Frequency - Probability of Hazard		●			●	●
Impervious Surfaces (from land cover data)		●			●	
Projected Flood Risk (third party resource)*						●
Projected Wildfire Risk (third party resource)*						●

Third party data provided by First Street Foundation

Sources

DOE Energy Justice Mapping Tool: https://www.energy.gov/diversity/justice40-initiative

DOT Equitable Transportation Community Explorer: https://experience.arcgis.com/experience/0920984aa80a4362b8778d779b090723/page/ETC-Explorer---National-Results/

EPA Environmental Justice Screening and Mapping Tool: https://www.epa.gov/ejscreen/what-ejscreen

CDC Social Vulnerability Index: https://www.atsdr.cdc.gov/placeandhealth/svi/documentation/SVI_documentation_2020.html

FEMA National Risk Index: https://hazards.fema.gov/nri/map

FEMA Resilience and Planning Tool: https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool

WH CEQ Climate and Economic Justice Screening Tool: https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5