



EPA Tools and Resources Webinar: Understanding Environmental Justice through two EPA tools – EJScreen and EnviroAtlas

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Environmental justice is the 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.

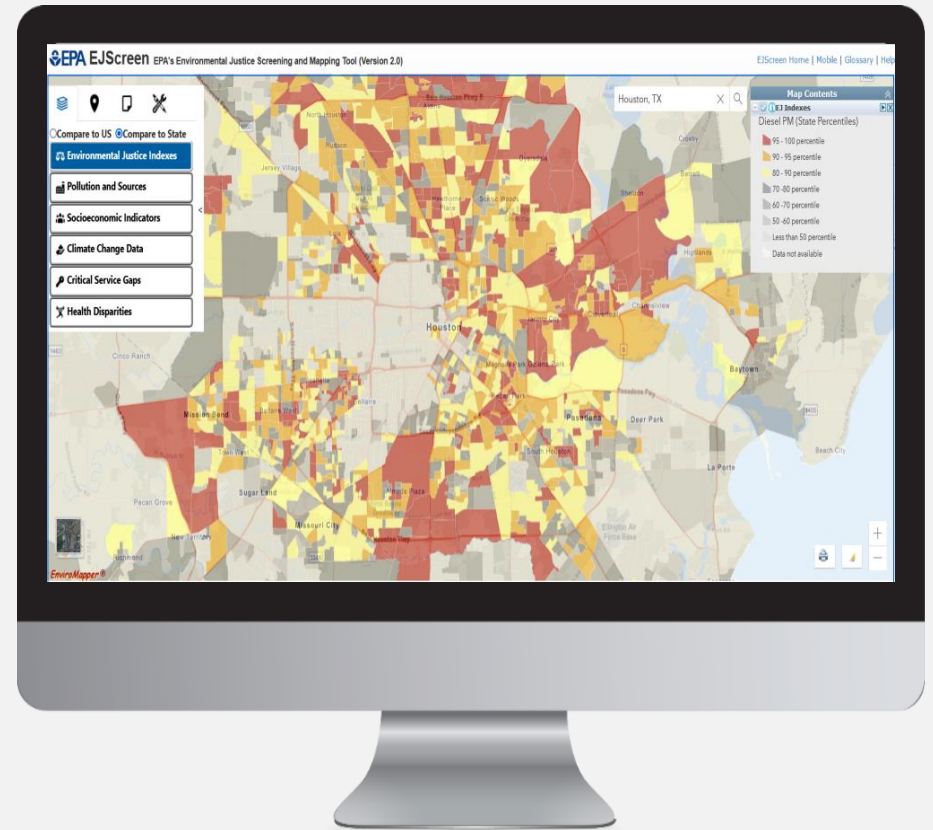
This goal will be achieved when everyone enjoys:

- The same degree of protection from environmental and health hazards,
- Equal access to environmental benefits, and
- Equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

Tools like EJScreen and EnviroAtlas can provide the information
to help move us towards this goal!

What is EJScreen?

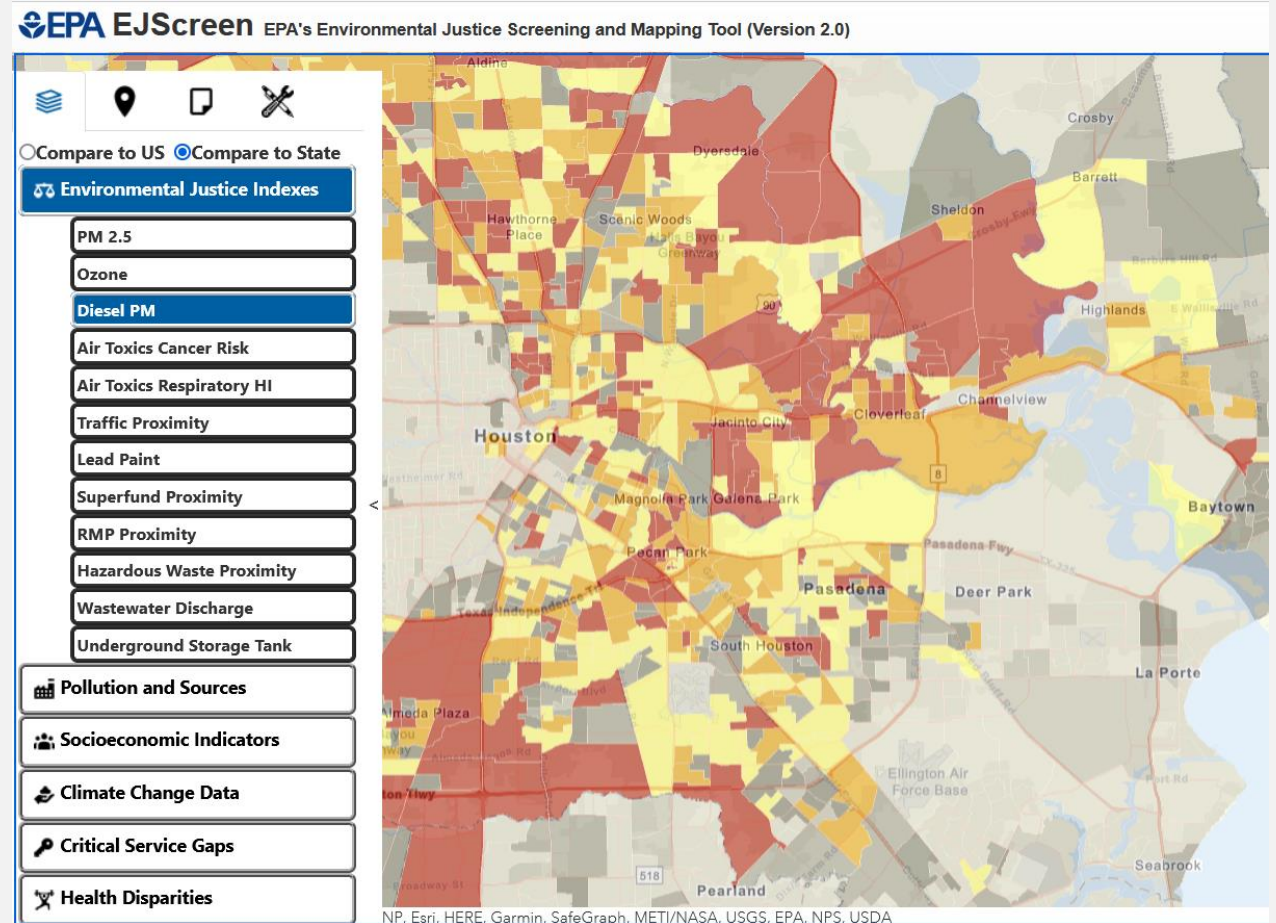
- EPA's web-based GIS tool for nationally consistent EJ screening and mapping
- Combines environmental and demographic data to highlight areas where vulnerable populations may be disproportionately impacted by pollution
- Starting point for agency considerations of environmental justice



[*Click to access EJScreen Tool*](#)

EJScreen Key Features

- 12 EJ Indexes – one for each environmental indicator
- Annually updated environmental data
- Annually updated demographics – from most recent US Census Bureau American Community Survey (ACS)
- Highest resolution data available
- Ability to download data
- Accessibility / ease of use



Caveats & Limitations

EJScreen does not cover all environmental or EJ issues

Environmental indicators are mostly screening-level proxies for actual exposure or risk

Indicators vary in vintage

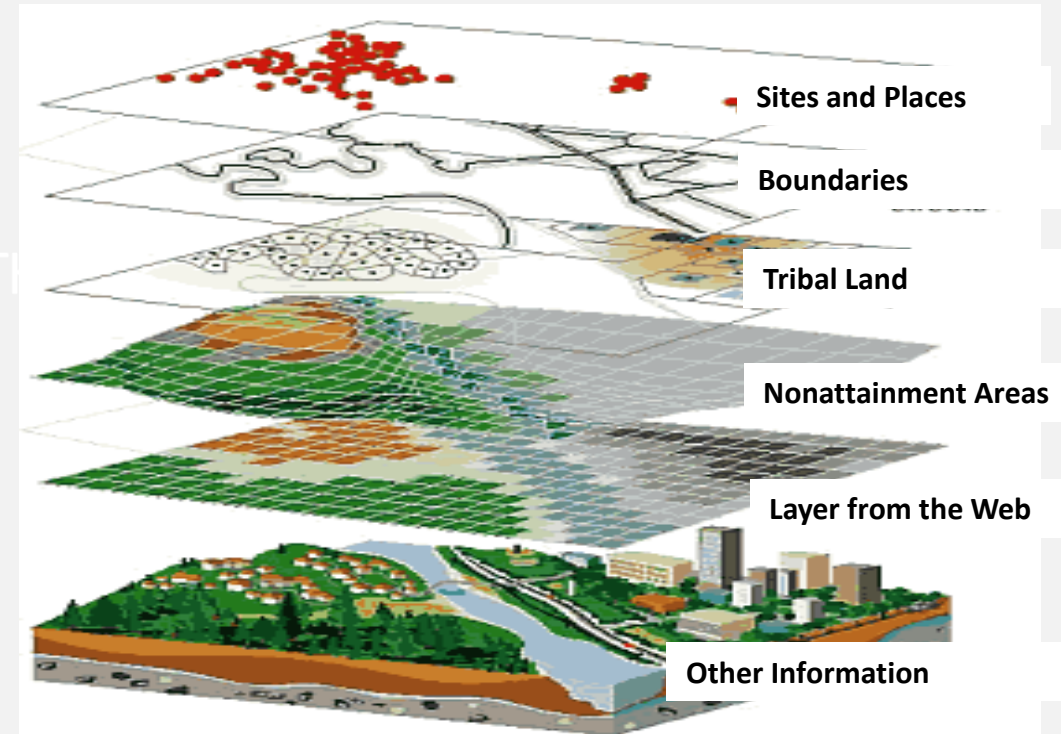
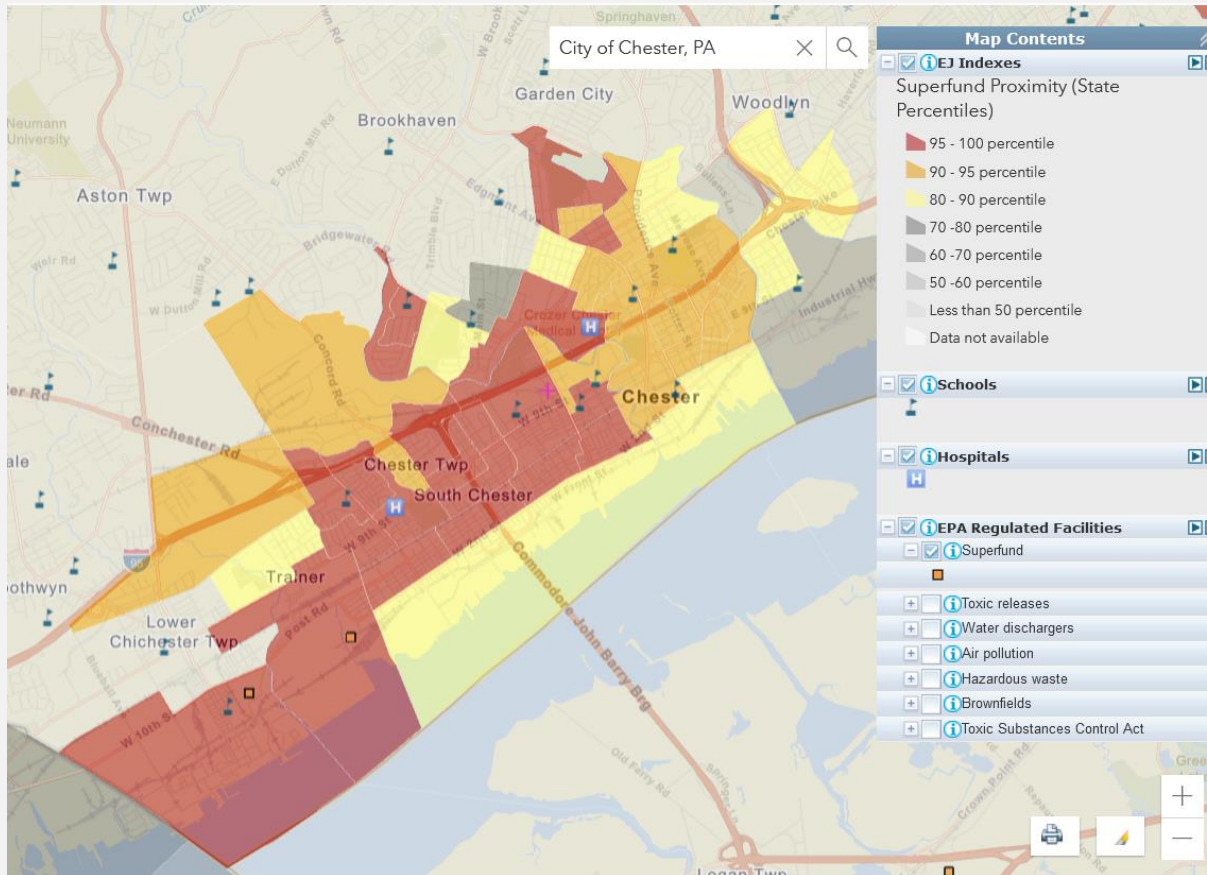
Census data has limitations and can obscure small communities

Results should be verified on the ground when possible

EJScreen does not label EJ communities

EJScreen Data

EJScreen adds many types of data by overlaying various datasets or “layers”



UNITS OF ANALYSIS



United States



State

primary governmental divisions of the United States.



County

Largest divisions within states.



Census Tract

Collection of Census block groups, mostly between 1,200 and 8,000 people.



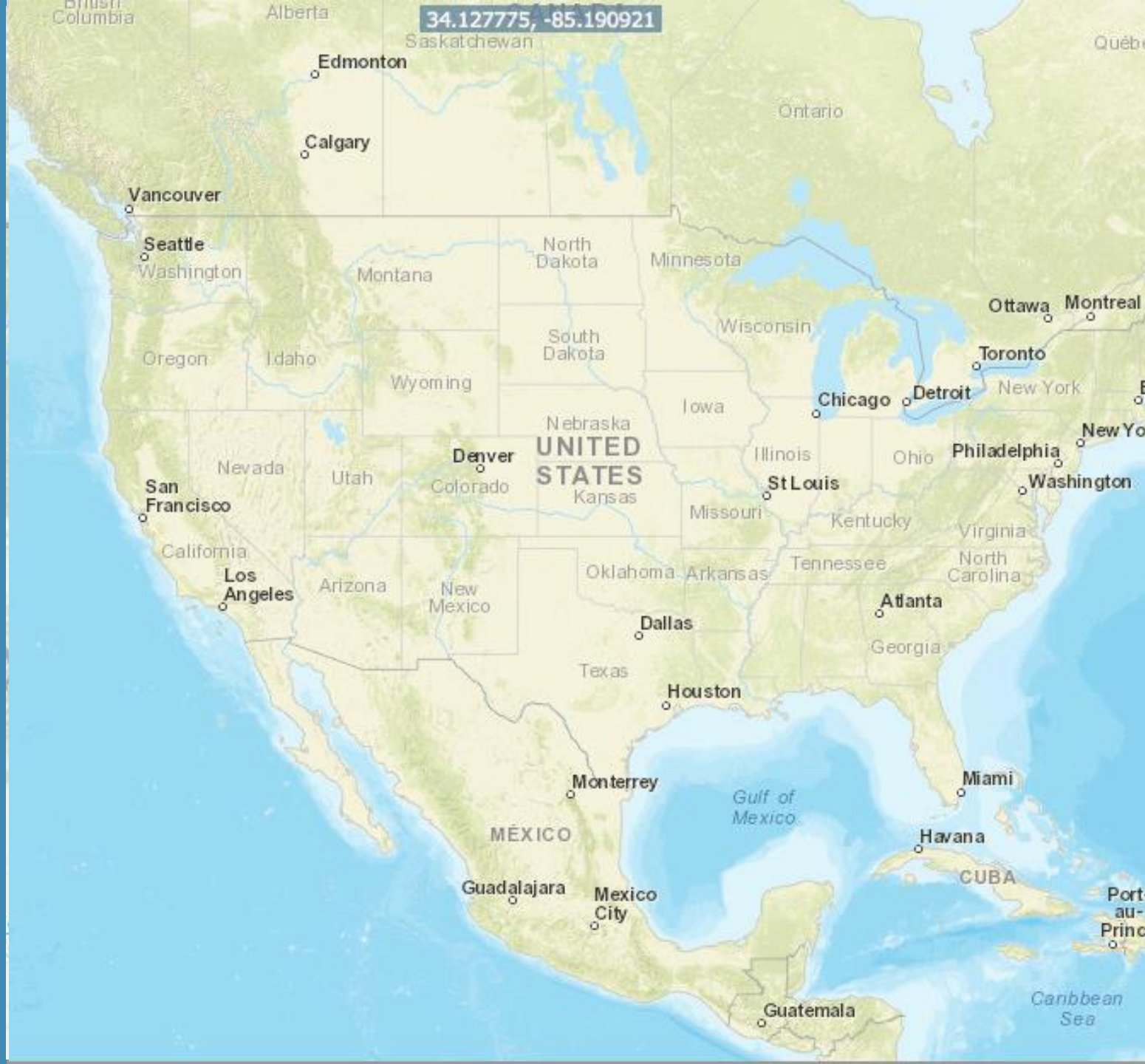
Block Group

Collection of residential blocks, mostly between 600 and 3,000 people.



Block

Residential block, bounded on all sides by streets.



Environmental Indicators

Indicator	Description	Year
Particulate matter 2.5	Annual average of PM 2.5 levels in the air	2018
Ozone	Ozone summer seasonal avg. of daily maximum	2018
Diesel particulate matter	Diesel particulate matter level in air	2017
Air toxics cancer risk	Lifetime cancer risk from inhalation of air toxics	2017
Air toxics respiratory hazard index	Air toxics respiratory hazard index (ratio of exposure concentration to health-based reference concentration)	2017
Traffic proximity and volume	Count of vehicles on major roads, divided by distance in meters	2019

Environmental Indicators (cont'd)

Indicator	Description	Year
Lead paint	Percent of housing units built pre-1960, as indicator of potential lead paint exposure	2015 - 2019
Superfund proximity	Count of proposed or listed NPL - also known as Superfund - sites within 5 km, each divided by distance in kilometers	2021
Risk management plan facility proximity	Count of RMP (potential chemical accident management plan) facilities within 5 km, each divided by distance in kilometers	2021
Hazardous waste proximity	Count of hazardous waste facilities (TSDFs and LQGs) within 5 km, each divided by distance in kilometers	2021
Underground storage tanks (UST) and leaking UST (LUST)	Count of LUSTs (multiplied by a factor of 7.7) and the number of USTs within a 1,500-foot buffered block group	2021
Wastewater Discharge Indicator	RSEI modeled Toxic Concentrations at stream segments within 500 meters, divided by distance in kilometers	2021

Socioeconomic Indicators (New ACS)

Indicator	Definition
People of color	Individuals who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino
Low-Income	Household income is less than or equal to twice the federal “poverty level”
Unemployment	All those who did not have a job at all during the reporting period, made at least one specific active effort to find a job during the prior 4 weeks, and were available for work (unless temporarily ill)
Linguistic isolated	Households in which all members aged 14 years speak English less than “very well” (have difficulty with English)
Less than high school education	People aged 25 or older whose education is short of a high school diploma
Under age 5	People in a block group under the age of 5
Over age 64	People in a block group over the age of 64
Demographic index	$(\text{Low income} + \text{People of Color}) / 2$

Health Indicators

Indicator	Definition
Low Life Expectancy	Average life expectancy
Heart Disease	Heart disease prevalence among adults aged 18 years or older
Asthma	Asthma prevalence among adults aged 18 or older

All Health indicators come from the CDC and are at the Census tract level

Climate Indicators

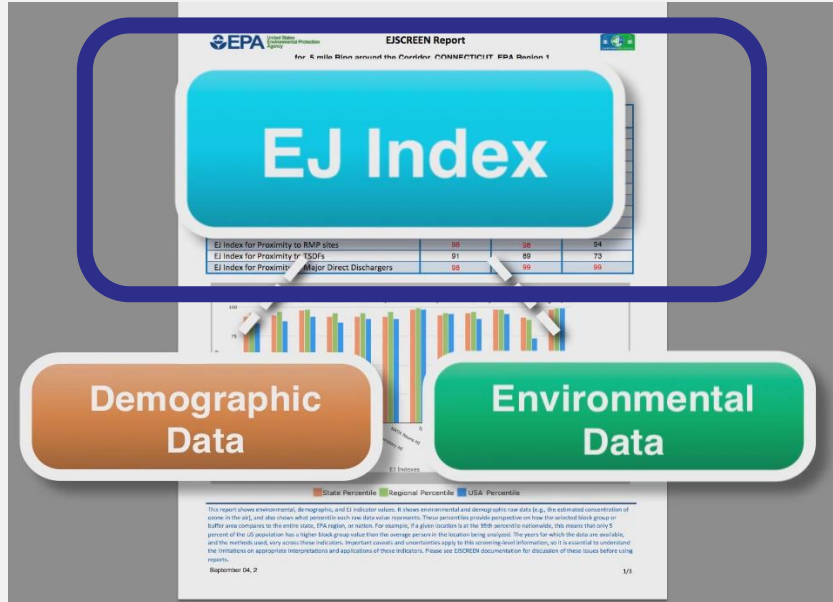
Indicator	Definition
Wildfire Hazard Potential*	Relative potential for wildfire that may be difficult to control
Drought*	Change in drought conditions across the contiguous 48 states from 1900 to 2020
Coastal Flood Hazard	Areas in coastal counties that are most prone to coastal flood hazards
100-year Flood Estimates	Estimated 100-year floodplains for the Conterminous US for 2016
Sea Level Rise	Land at risk of permanent flooding when sea level rises

*New indicators in 2022

Critical Service Gaps Indicators

Indicator	Definition
Food Desert	Low income and low access to food (USDA data)
Medically Underserved	Areas having too few primary care providers, high infant mortality, high poverty or a high elderly population.
Broadband Internet	Areas where less than 50% of population has broadband

What does the EJ Index mean?



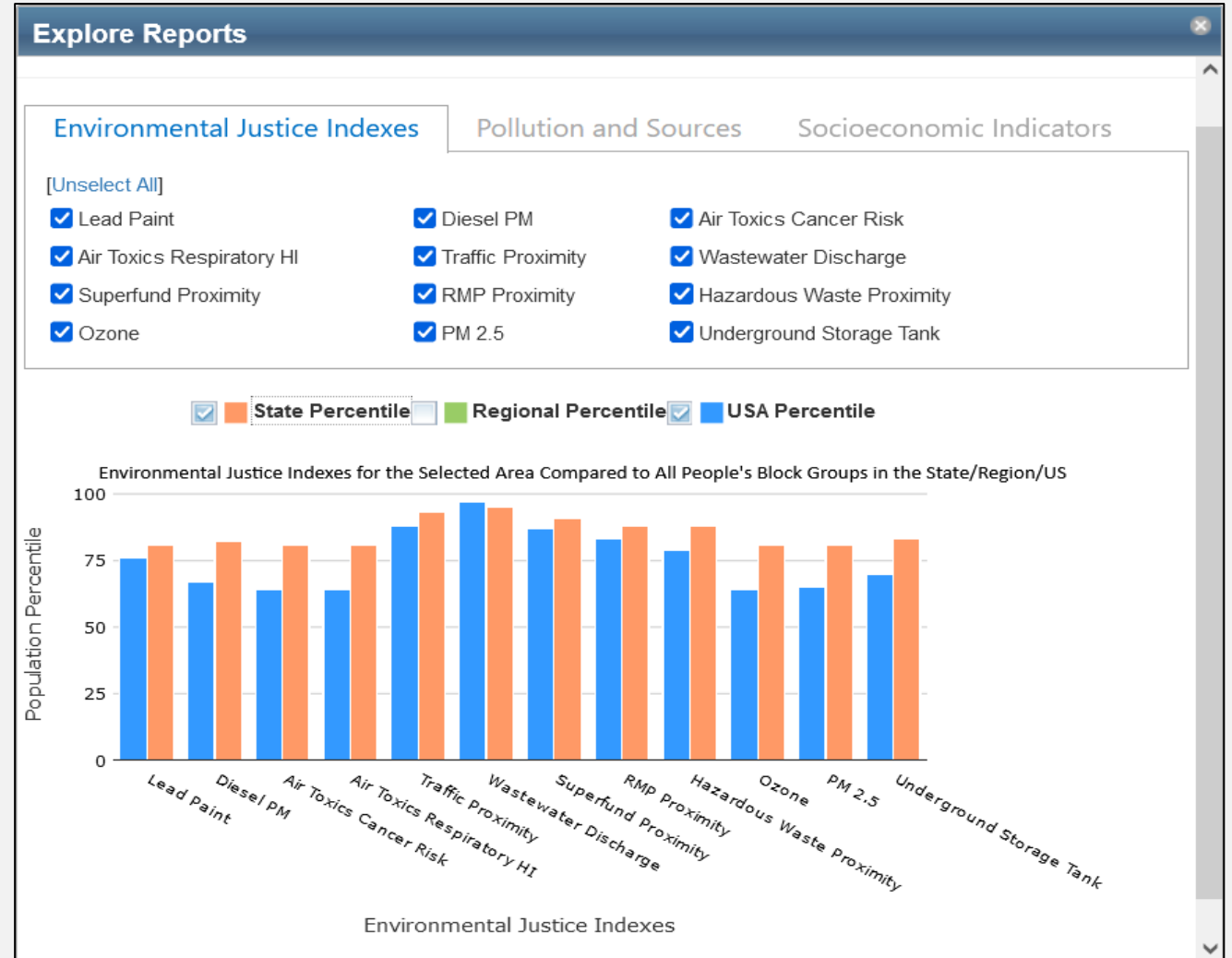
It helps identify areas that may have **higher pollution burdens** and **vulnerable populations** present

EJ Index
Calculation:

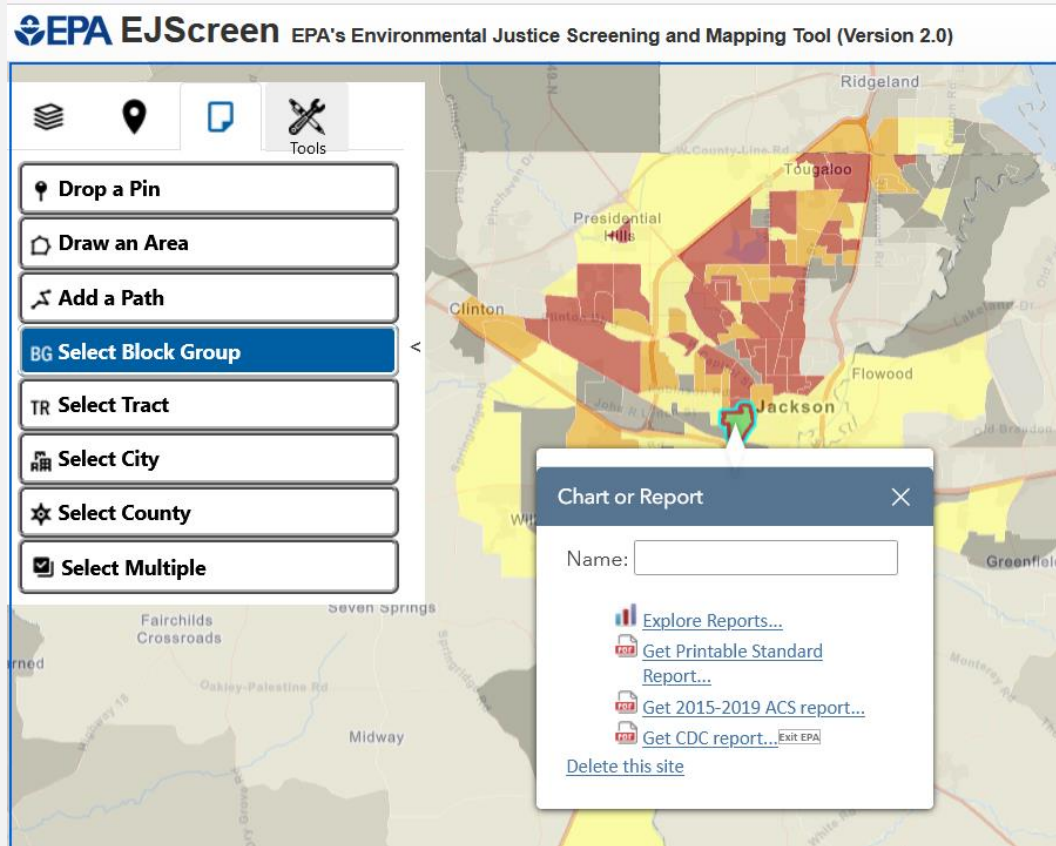
$$\begin{aligned}
 & \text{Single Environmental Indicator} \\
 & X \quad (\text{Demographic Index} - \text{US Average Demographic Index}) \\
 & X \quad \text{Block Group Population}
 \end{aligned}$$

Results are Ranked as Percentiles

- Percentiles put indicators into common units of 0 – 100.
- A place at the 80th percentile nationwide means 20% of the US population has a higher value.
- Ranking values as percentiles allows comparison of indicators measured with different units. It does not mean the risks are equal or comparable.



EJScreen Reports

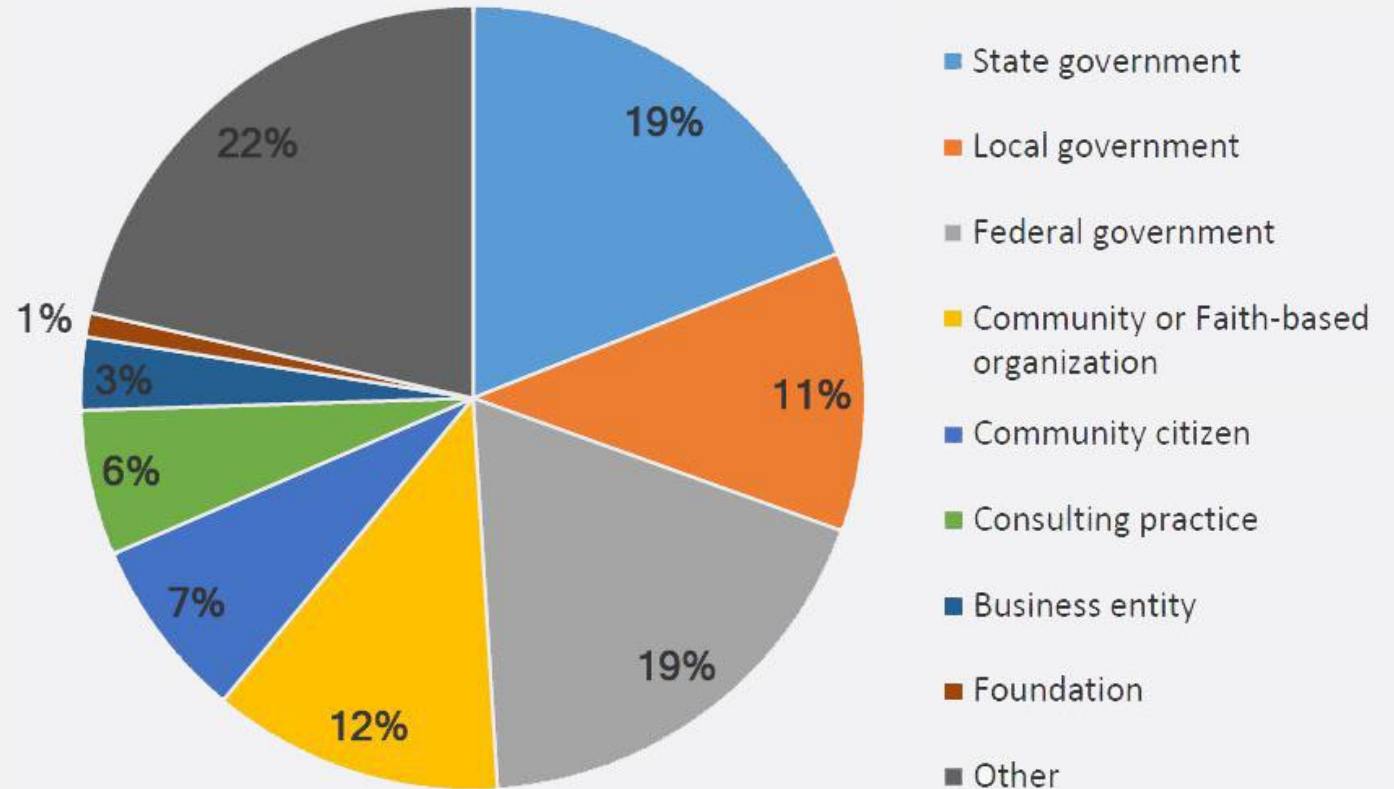


- User to define areas of assessment
 - Various ways to define area
- Multiple reports available in EJScreen
 - Printable Standard Report
 - American Community Survey Report
 - CDC Health Report

EJScreen in Action: External Users

- EJ analyses
- Community outreach
- Prioritization
- Retrospective reports
- Environmental analysis
- Education and teaching
- Research

Who is using EJScreen?



Future of EJScreen

Examining EJ relevant data to incorporate (water, CAFOs, pesticides)

Potential for addressing cumulative impacts

Considering inclusion of an alternative EJ index with different demographics

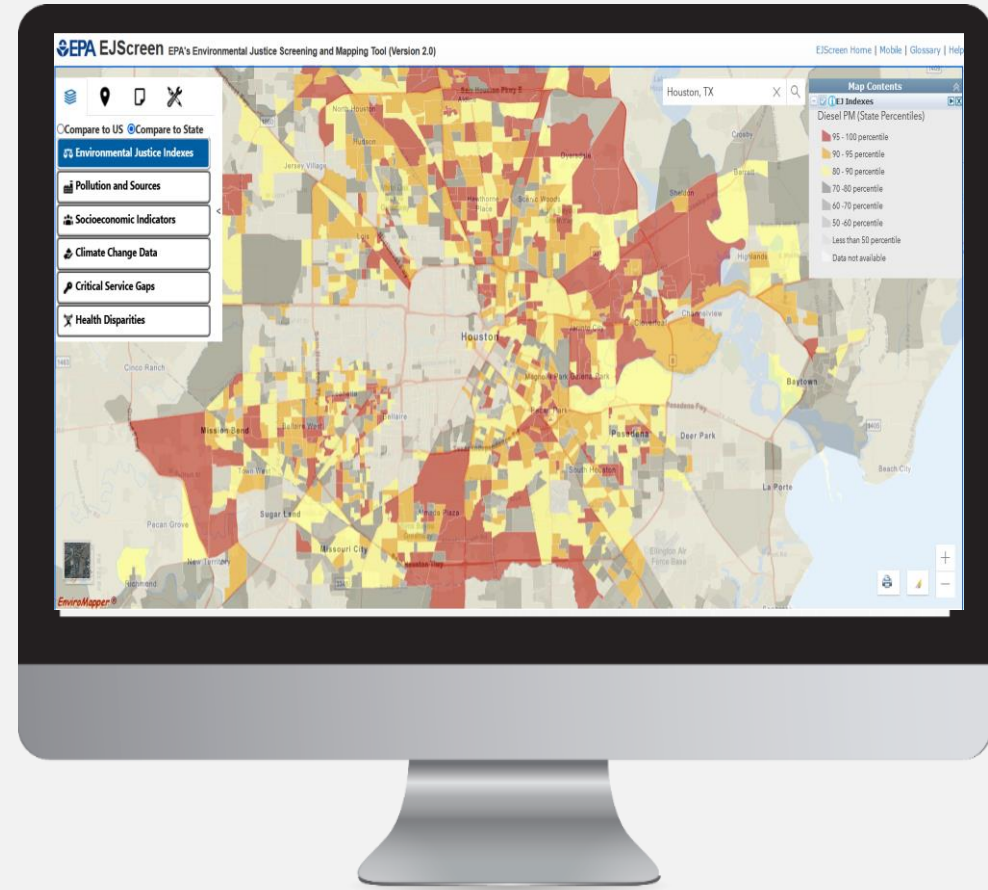
Continued work with states to address local needs/data

Development of threshold maps that make the tool easier to use

Focus on incorporation into EPA programs and activities

EJScreen Tool Learning Resources

- EJScreen website
- Guidance documents
- Video tutorials
- Technical information
- Understanding results
- Other tools and resources



[Click to access EJScreen Tool](#)

Climate and Economic Justice Screening Tool

- In Executive Order 14008 on *Tackling the Climate Crisis at Home and Abroad*, President Biden directed the Council on Environmental Quality (CEQ) to create a Climate and Economic Justice Screening Tool (CEJST).
- CEJST's clear and singular purpose is to help federal agencies identify disadvantaged communities that have been historically marginalized, underserved, and overburdened by pollution.
- The tool provides important information for the Justice40 Initiative.

EJScreen & CEJST

- CEJST is currently beta and will only be used for Justice40 implementation when finalized.
- CEJST is largely based on the same datasets featured in EJScreen.
- CEJST and EJScreen serve different functions and have very different abilities.
- EJScreen will continue to be used by EPA and our partners to screen for areas with potential environmental justice concerns.
- CEJST will not replace EJScreen.

What is EnviroAtlas?

EnviroAtlas is an online resource providing geospatial data, easy-to-use tools, and other resources related to ecosystem services, their chemical and non-chemical stressors, connections to human health, and equity.

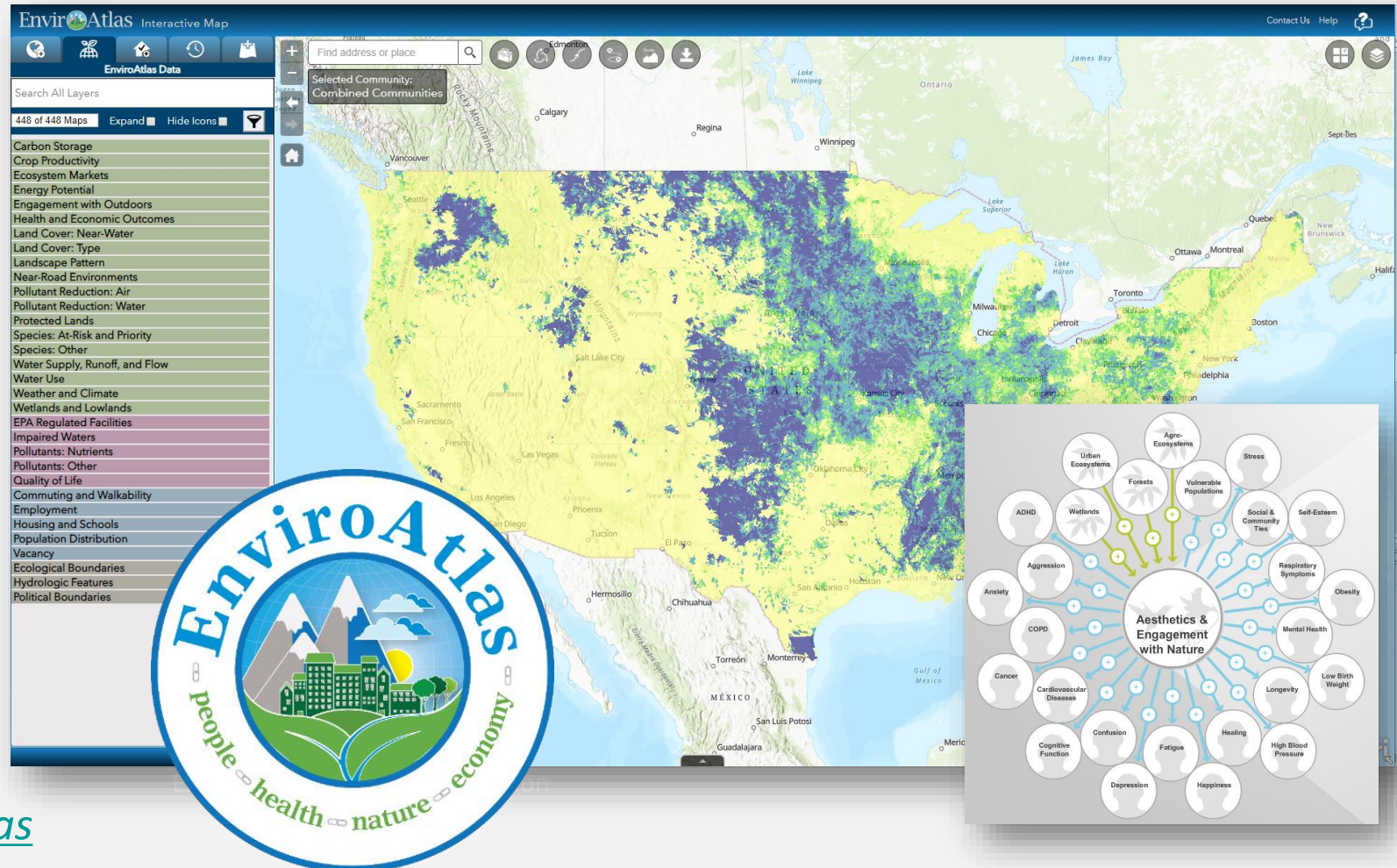
- Over 500 map layers, environmental and demographic

- Tools for finding relevant data

- **Interactive Mapping Application**

- **Eco-Health Relationship Browser**

- Tools for analysis

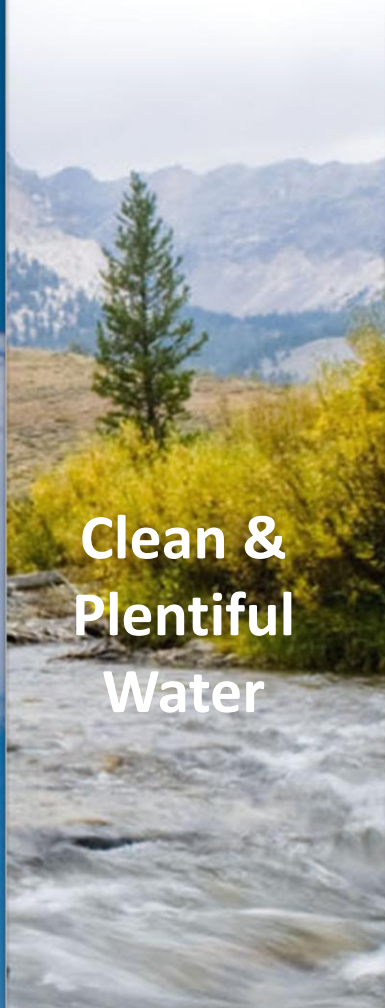


The screenshot displays the EnviroAtlas Interactive Map interface. The top navigation bar includes a search bar, a list of map layers (448 of 448 Maps), and a navigation panel. The main map area shows a stylized map of the United States with various data layers overlaid, including a color-coded map of the United States. A circular logo for EnviroAtlas is overlaid on the map, featuring a stylized landscape with mountains, a city, and a sun, surrounded by the text 'EnviroAtlas' and 'people health nature economy'. To the right of the map is a diagram titled 'Aesthetics & Engagement with Nature' showing a central node connected to various health and well-being outcomes.

Clean Air



**Clean &
Plentiful
Water**



**Biodiversity
Conservation**



**Food, Fuel
&
Materials**



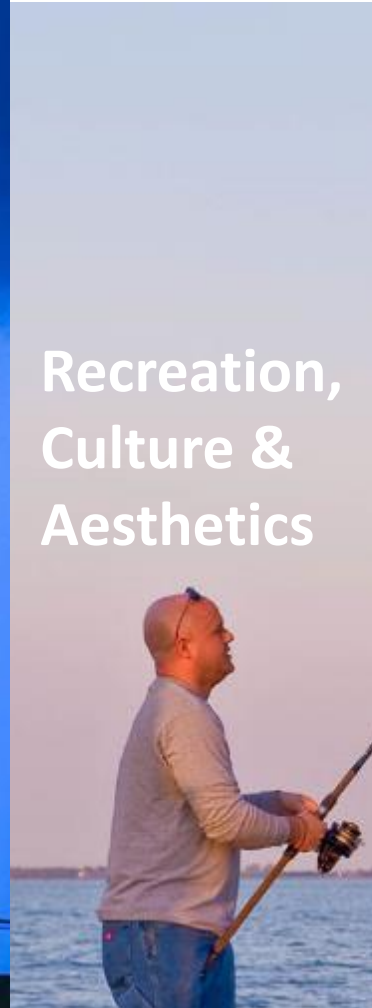
**Natural
Hazard
Mitigation**



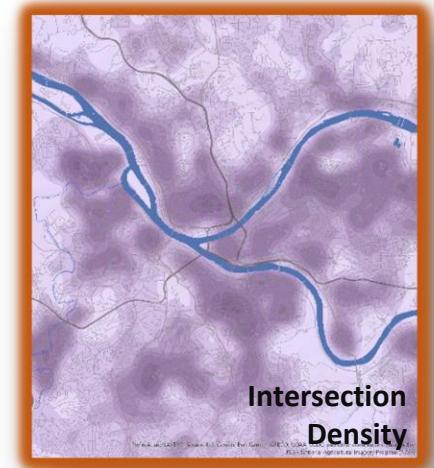
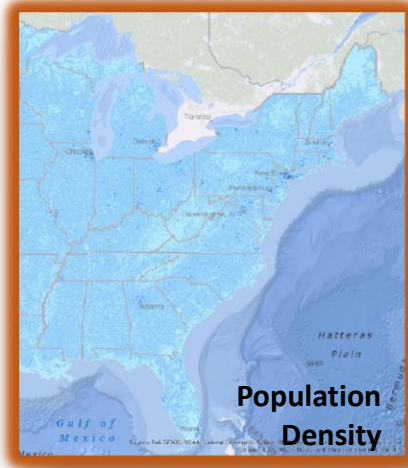
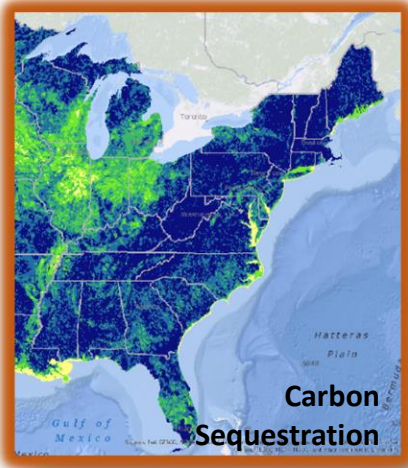
**Climate
Stabilization**



**Recreation,
Culture &
Aesthetics**



Ecosystem Services Benefit Categories



National Data

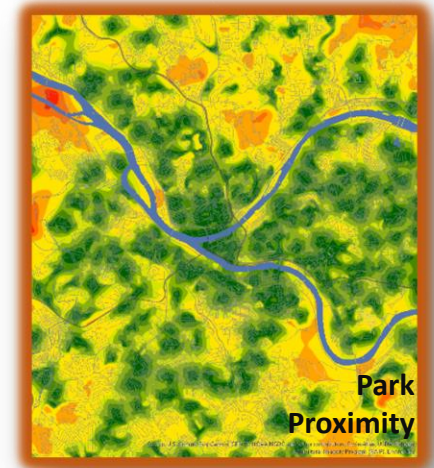
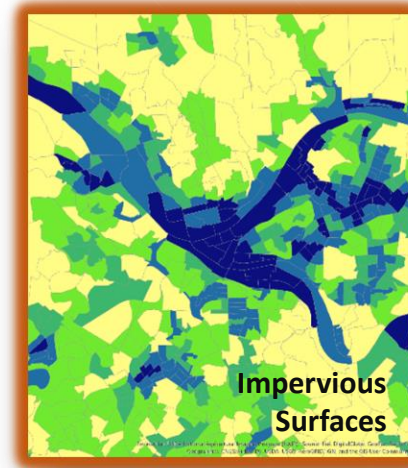
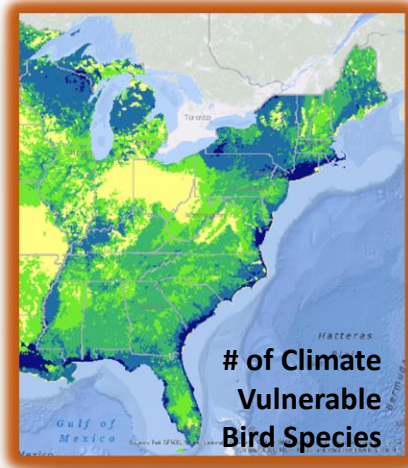
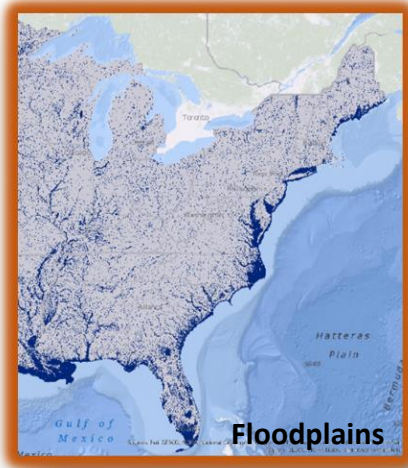
30-meter land cover
 400+ unique data layers
 Consistent data for the
 conterminous US

EnviroAtlas

Data Fact Sheets
 Peer-reviewed
 Standard Metadata
 Open access

Community Data

1-meter land cover
 100+ unique data layers
 30 metropolitan areas
 1450 cities & towns (65+ million people)

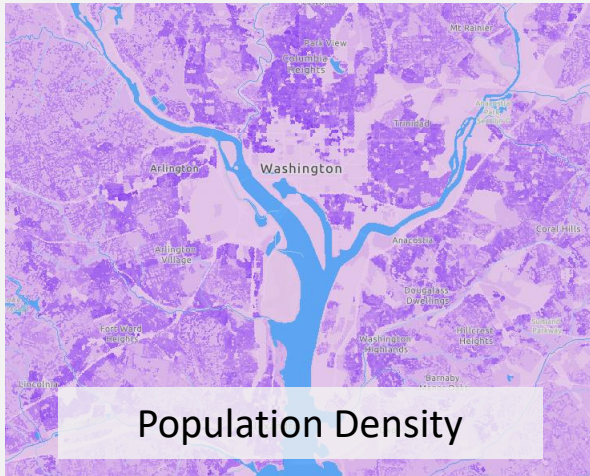


Data in EnviroAtlas

- EnviroAtlas provides data at multiple extents and scales

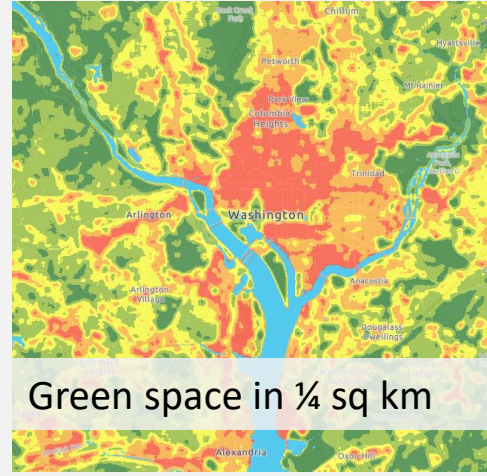
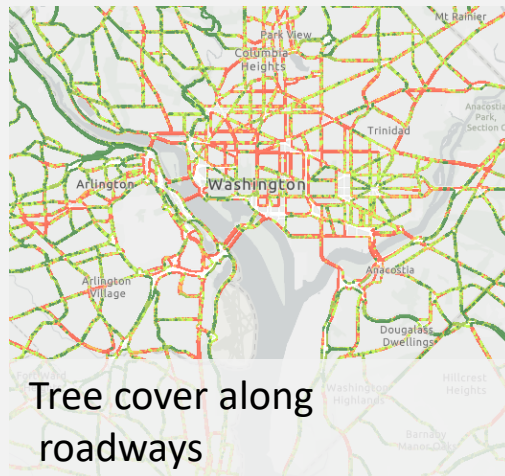
Pixel based / Raster

- Fine detail



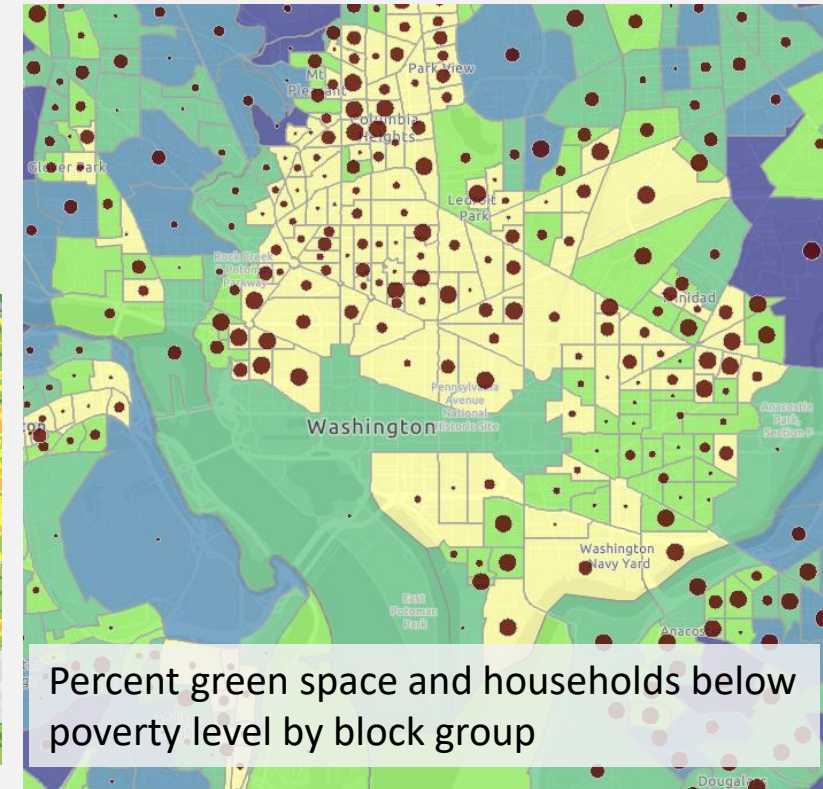
Lines/Vectors

- Individual features

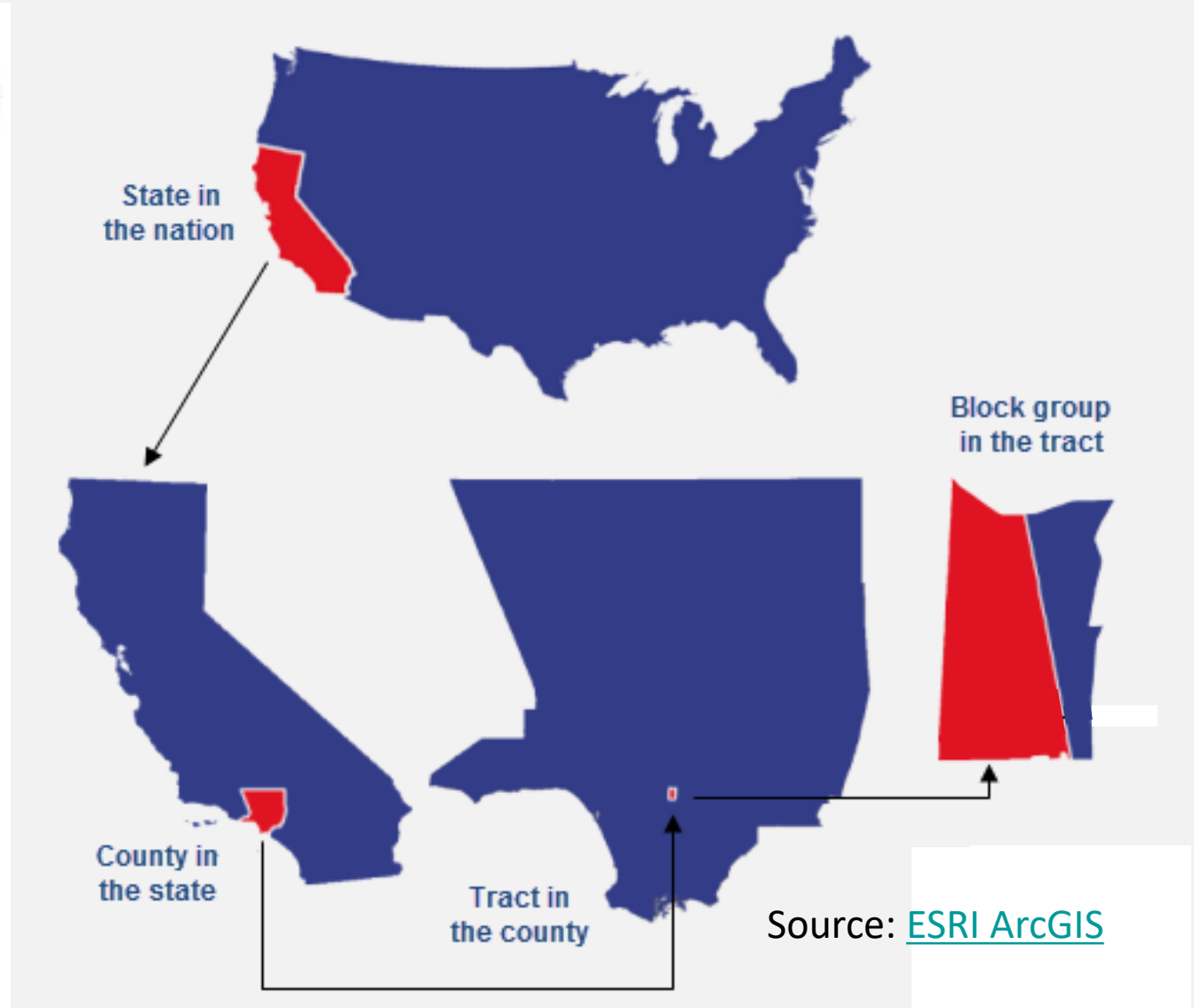
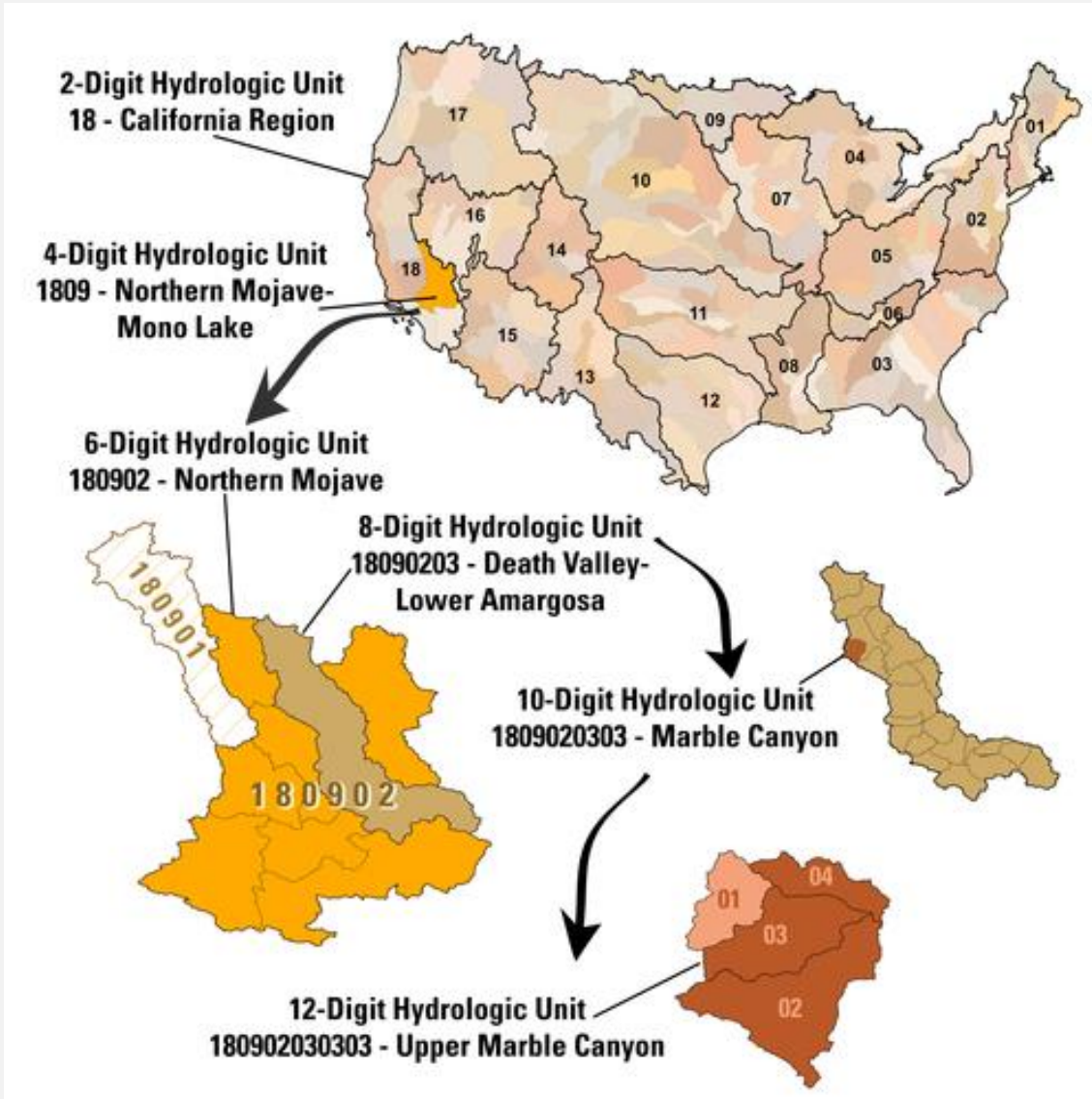


Summaries by Census block group, Census tract, watersheds

- Allows for data overlays



Summarized Data

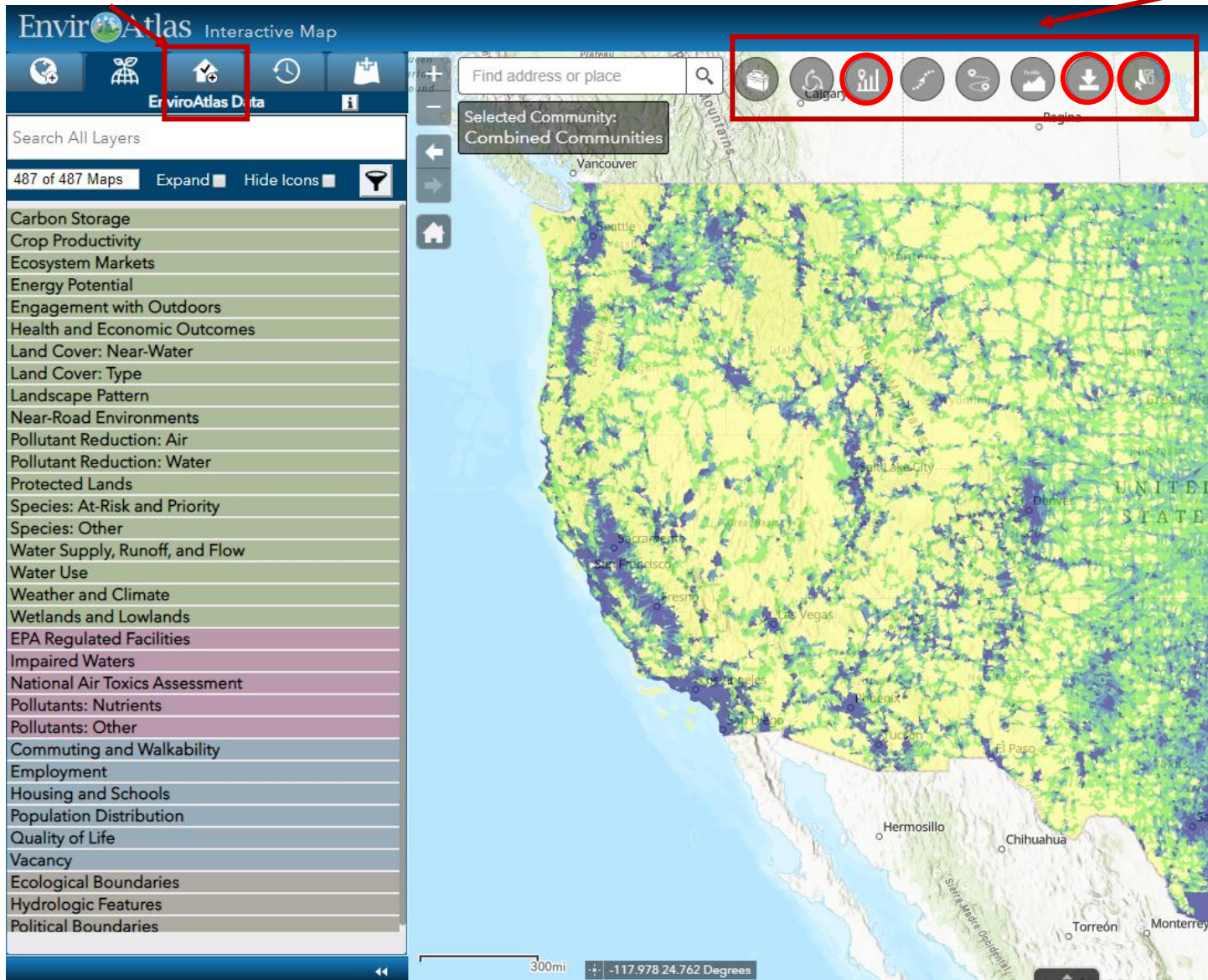


EnviroAtlas Interactive Map

US Census Demographic Data

Built-in analysis tools

Data Topics



- Access EnviroAtlas Data:
 - Via our Interactive Map
 - Use web services
 - Download data
- Users can add their own data to our map for a session
- Users can search for data from the internet and add to map
- Save your session and return to it

EnviroAtlas data and resources can be used in a range of projects, from regional to local scales. The examples provided here are meant to introduce some EnviroAtlas datasets and tools and demonstrate how they might be used in various contexts. [If you have used EnviroAtlas resources, or have an idea for an example use or case study, we'd love to hear from you!](#)

EnviroAtlas
people health nature economy
www.epa.gov/enviroatlas

Acres of Land Enrolled in the Conservation Reserve Program (CRP)

This EnviroAtlas national map depicts the acres of land within each 12-digit hydrologic unit (HUC) enrolled in the US Department of Agriculture's (USDA) Conservation Reserve Program (CRP). The CRP, established in 1985, is administered by the USDA Farm Service Agency. Farmers enrolled in the program receive annual rent payments and establishment cost share to remove environmentally sensitive land from crop production and plant environmentally beneficial perennial species.



Why is the Conservation Reserve Program important?

Farmers may voluntarily enroll marginal farmland in the CRP for 10 to 15 years. Environmentally sensitive or marginal farmland includes stream or lake riparian areas, periodically saturated or flooded lowland, or soils subject to wind or water erosion. Depending on the character of the candidate farmland, the CRP offers a number of initiatives with management practices tailored to wetland and riparian areas, duck and upland bird habitat, wildlife enhancement, retention of highly erodible soils, or honeybee and native pollinator habitat.

Farmland returned to natural cover may provide a number of ecosystem services that represent a long term investment in increased agro-ecosystem productivity. Natural land cover on sensitive areas helps protect water quality and terrestrial and aquatic habitat. Natural grassland and woodland slow stormwater runoff, filter pollutants from the air and soil, recharge groundwater, moderate air and water temperatures, and sequester carbon to mitigate global warming. A recent Farm Service Agency study reported that exports of sediment and nutrients fell to 0 after marginal cropland was planted with CRP natural cover.¹ By FSA estimates, CRP is responsible for a reduction of 450 million tons of erosion annually. Targeting the most highly erodible cropland could further increase the retention of erodible soils.² Another study on the high plains Ogallala aquifer in Oklahoma found that CRP parcels significantly increased groundwater recharge in areas where irrigation had reduced groundwater supplies.³

CRP acreage, particularly native pollinators such as bees, butterflies provide a critical service to ecosystems. About 75% of all crop and domesticated (honeybee) pollinators.⁴ The lack of local

pollinators can result in lost crop productivity. Recent declines in honeybee populations make the services provided by wild pollinators even more critical to maintaining stable crop yields.⁴ Native pollinators require blooming plants throughout the growing season and nesting habitat in tree cavities or abandoned insect or rodent nests.⁵

CRP acreage is important in the Prairie Pothole region of the Northern Great Plains to maintain and restore duck breeding habitat. Results from a study evaluating the nesting success of 5 duck species during 1992-1997 in CRP vs. non-CRP acres estimated an additional 12.4 million recruits to the fall migration attributed to improved CRP habitat.⁶

CRP enrollment is affected by factors such as farm bill enrollment caps, high commodity crop prices, and regional rental rates. The most recent 2014 farm bill reduced annual enrollment to a cap of 24 million acres in 2018, a reduction from a high enrollment of 37 million acres in 2007.⁷ High crop prices and early opt-out provisions raise concerns that more CRP acreage may be returned to agricultural uses.

How can I use this information?

This map identifies the number of acres of agricultural lands within a 12-digit HUC that are enrolled in the Program. The map can be used to identify CRP acres that may be in need of wetland restoration or other such as National Wetland Inventory floodplains to analyze how agricultural lands relate to wetland ecosystem services.

Use Cases

EnviroAtlas Examples



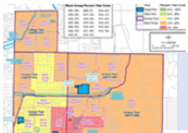
Prioritizing Tree Planting in Durham, NC

- This example shows how a planner might use EnviroAtlas to prioritize the planting of additional trees to benefit children in the vicinity of Durham, NC. [Story Map, 2015]
- This story highlights how EPA researchers ultimately helped the City of Durham analyze and prioritize tree plantings in their neighborhoods. [Webpage, 2019]



Using EnviroAtlas to Identify Locations for Urban Heat Island Abatement

Excessive heat can be dangerous to human health. Vegetation and trees can help reduce urban heat island. This example explores one solution for minimizing the negative impacts of excessive summer heat due to urbanization in Portland, OR. [PDF, 2017]



Using EnviroAtlas in a Health Impact Assessment (HIA)

Is it whether to adopt a policy and organizations to use in county parks. [PDF, 2017]

EnviroAtlas - Accessing a National Dataset

Search All Layers

427 of 427 Maps

Carbon Storage
Crop Productivity
Ecosystem Markets
Energy Potential
Engagement with Outdoors
Health and Economic Outcomes
Land Cover: Near-Water
Land Cover: Type
Landscape Pattern
Near-Road Environments
Pollutant Reduction: Air
Pollutant Reduction: Water
Protected Lands
Species At Risk and Priority

Common bird species in steep decline
Maximum Mean ASP

Modeled O1, O2, O3 species
Maximum Mean ASP

Modeled IUCN threatened terrestrial vertebrate species
Maximum Mean ASP

Modeled Partners in Amphibian and Reptile Conservation (PARC) species
Maximum Mean ASP

Modeled Partners in Flight Watch List bird species
Maximum Mean ASP

Modeled State of the Birds species of conservation concern
Maximum Mean ASP

Modeled threatened and endangered vertebrate species
Maximum Mean ASP

Watch on YouTube

EPA
United States Environmental Protection Agency

EPA/600/RR-15/128

Health Impact Assessment (HIA) & EnviroAtlas

Integrating Ecosystem Services in Making Process

Guides

Office of Research and Development
National Exposure Research Laboratory

Data and tools are not enough

Educational materials

K - 6

Exploring Your Watershed

4 - 6

Introduction to Ecosystem Services

4 -12+

Connecting Ecosystems and Human Health

9 - 12+

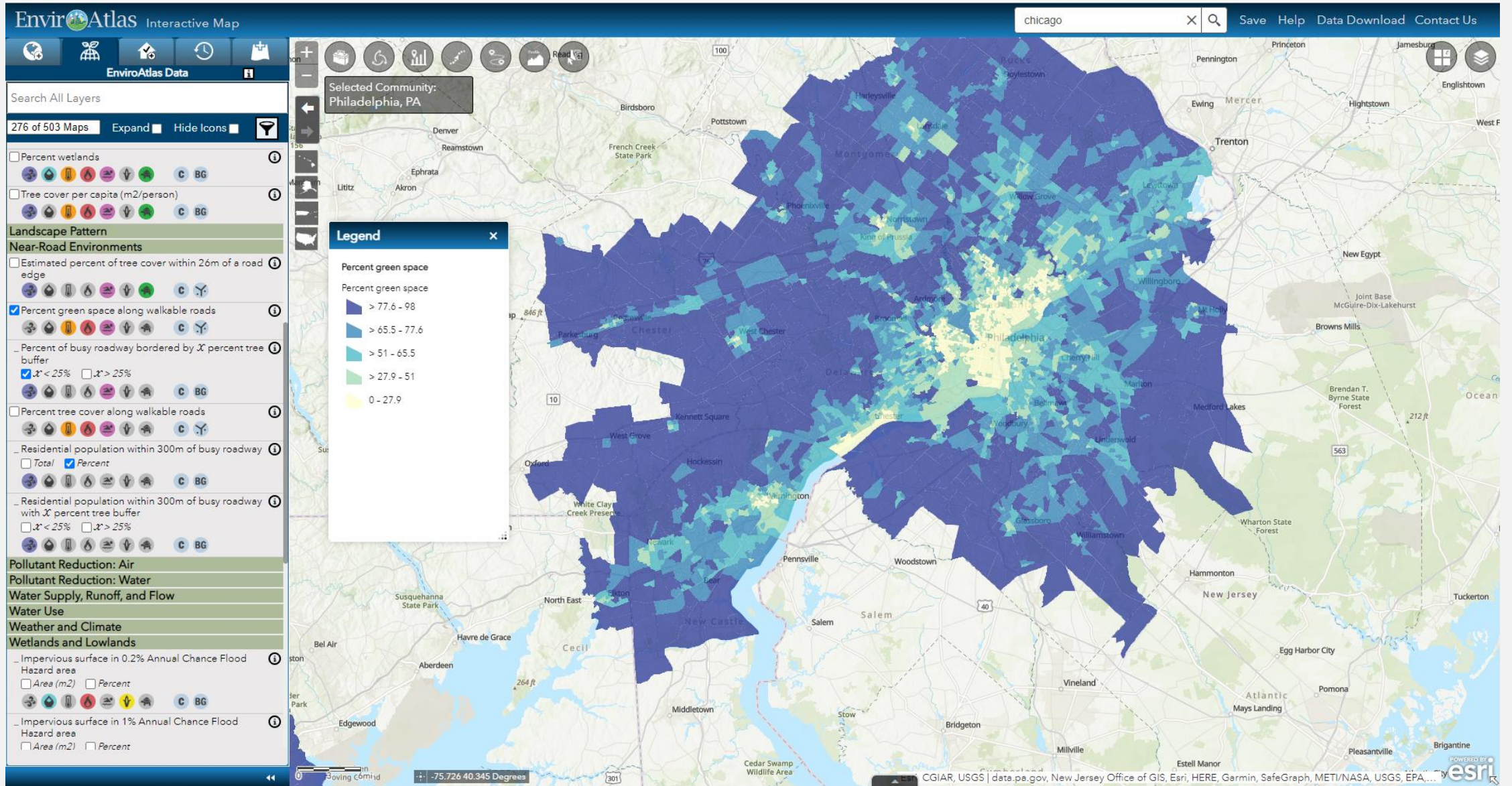
Building a Greenway Case Study*

*With new environmental justice component

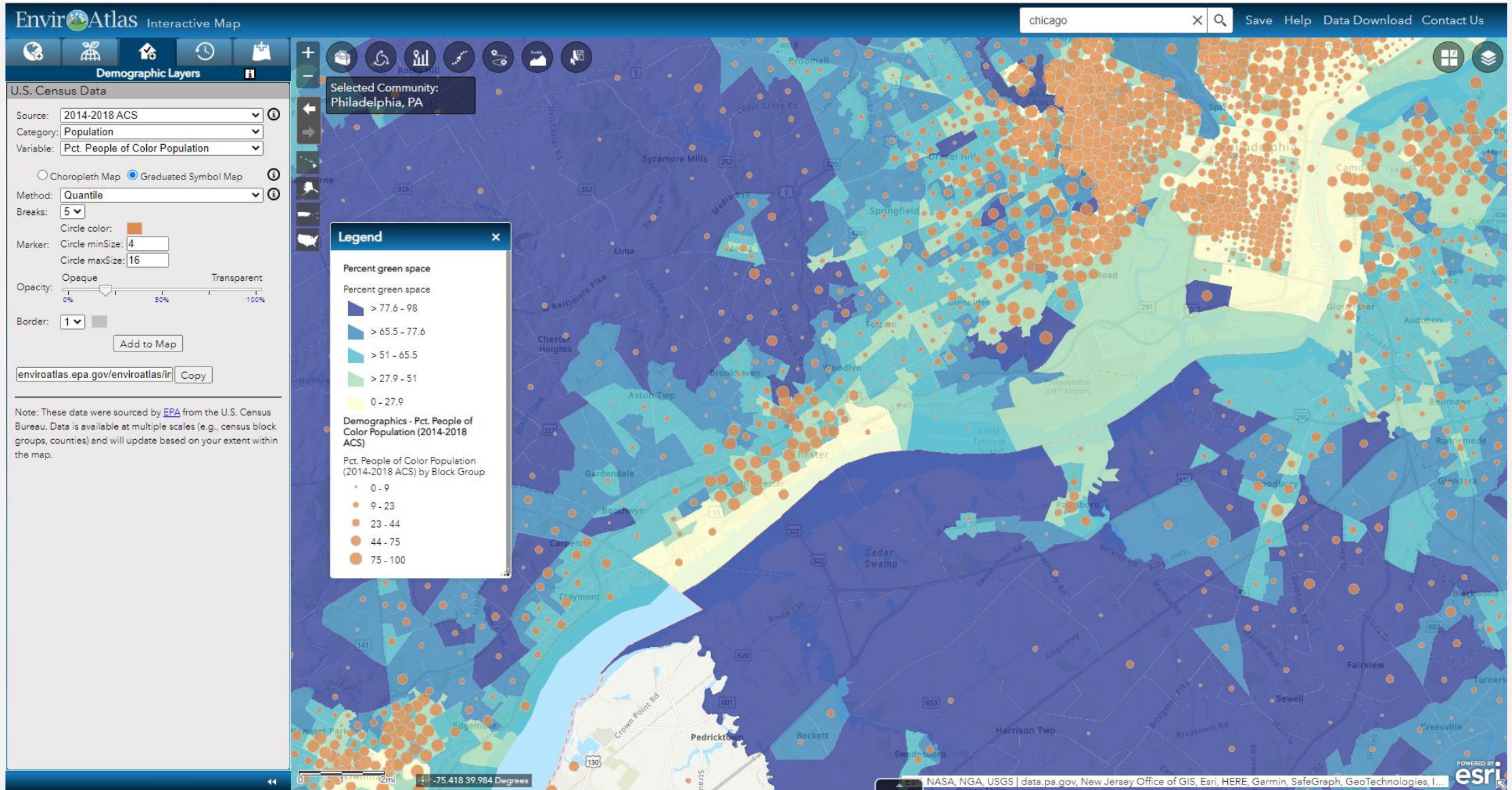
EnviroAtlas and Environmental Justice

- Environmental injustice can be related to inequity associated with exposure to stressors as well as access to assets.
- Includes data relevant to environmental justice, such as:
 - Demographic data
 - Opportunity zones
 - Climate scenarios, flooding, park access, green space, exposure, proximity to pollution sources and others
 - Redline maps (coming soon)
- Add data function allows for inclusion of:
 - EJSCREEN indices
 - Local / national data of interest
- Educational lesson plan targeted to high school, undergraduate, other audience, *‘Considering Environmental Justice in Building a Greenway’* incorporating EJ concepts and data from EJSCREEN
- Some EnviroAtlas data incorporated into EJScreen

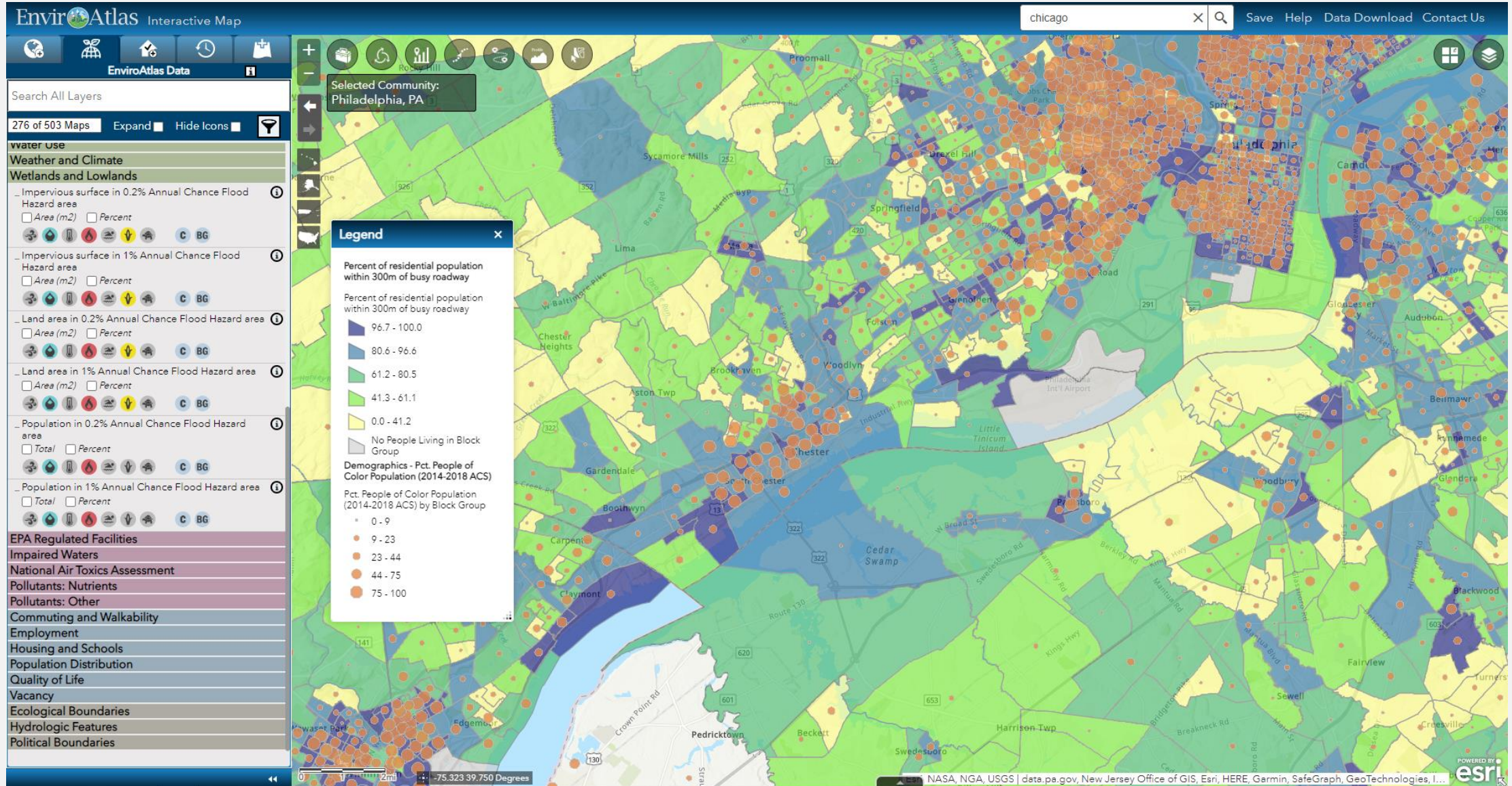
EnviroAtlas – Percent green space across Philadelphia



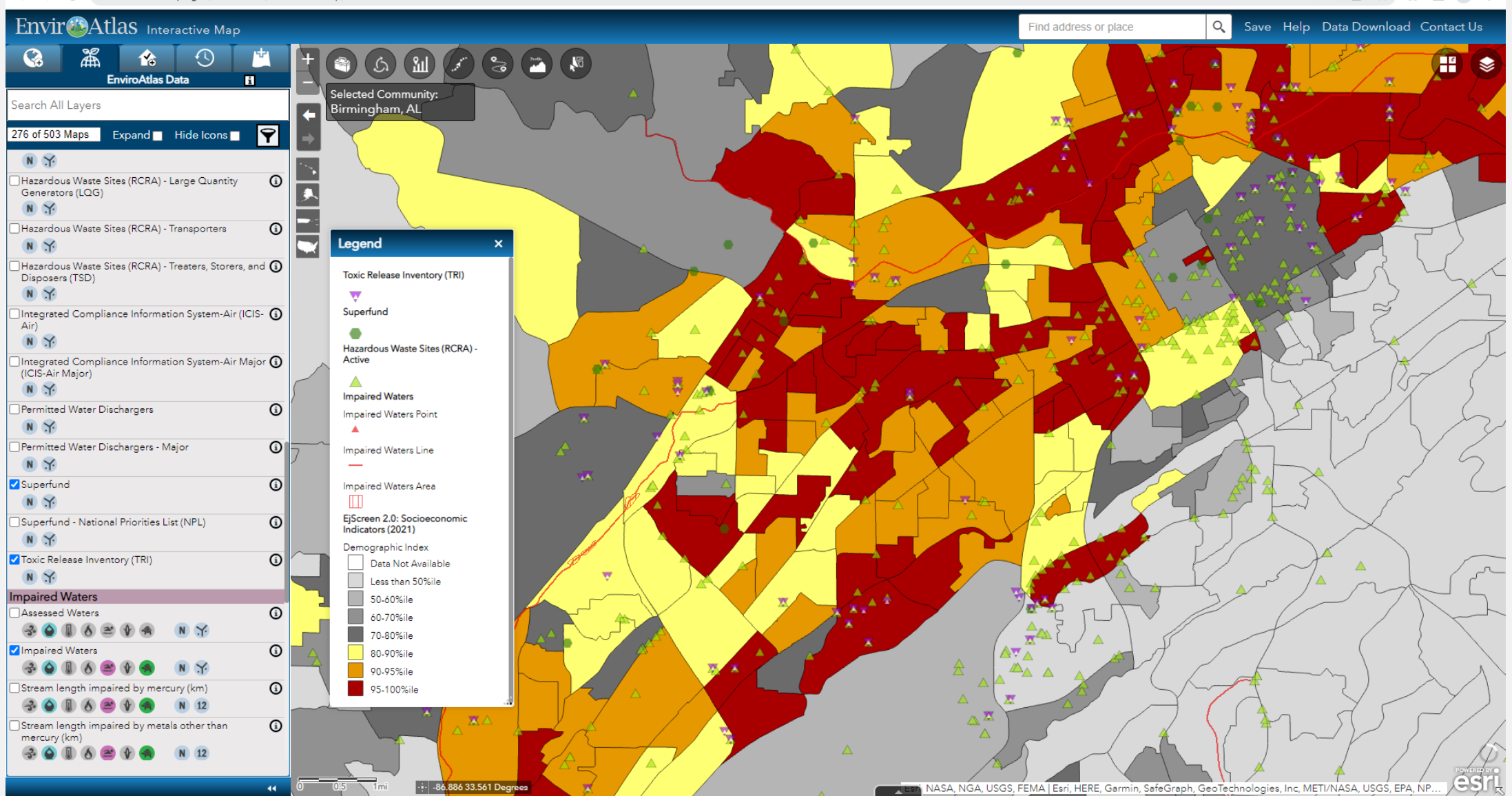
EnviroAtlas – Percent green space in area of Philadelphia overlaid with percent people of color



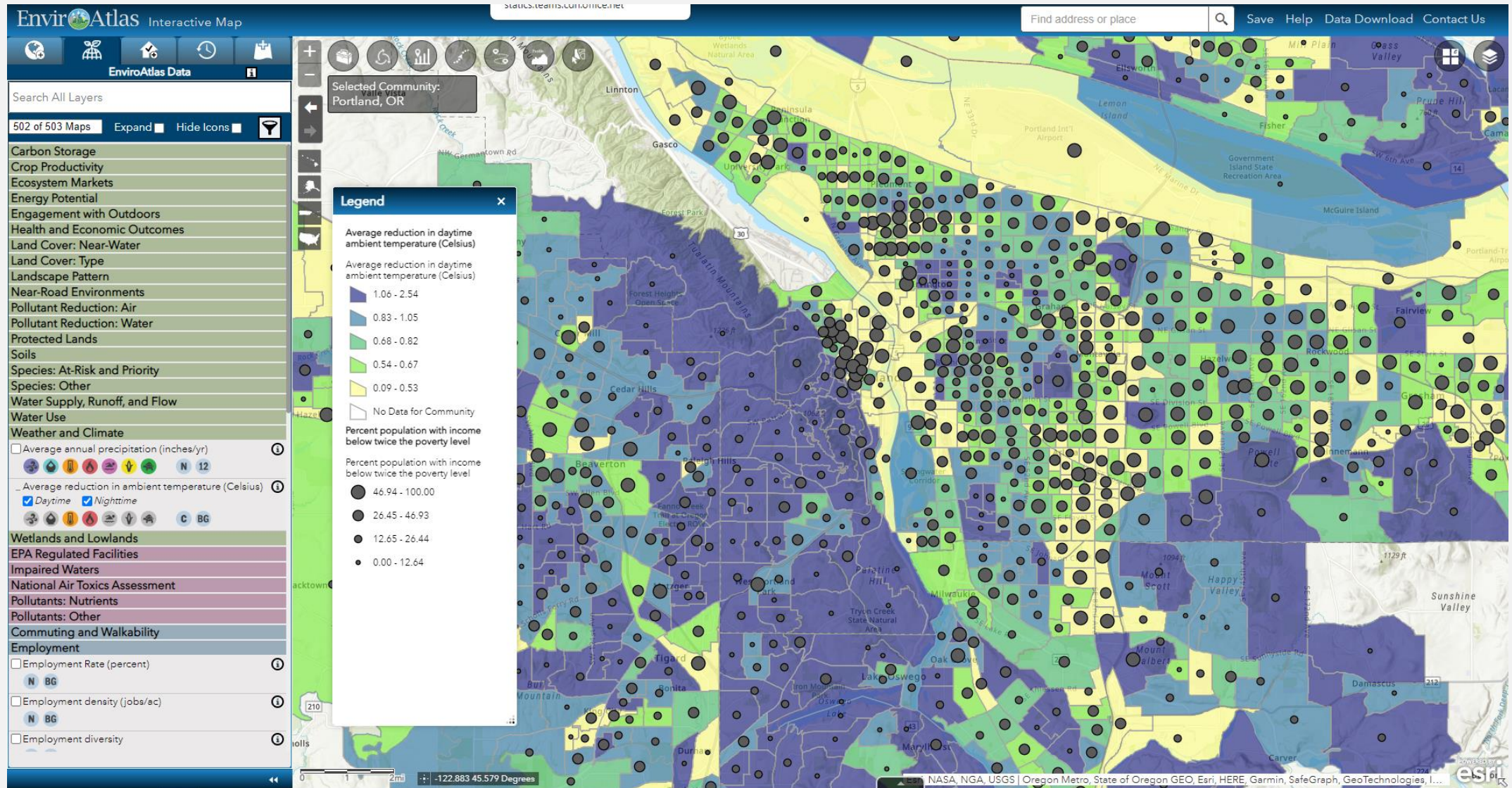
EnviroAtlas – Percent of population living within 300 m of a busy roadway overlaid with percent people of color



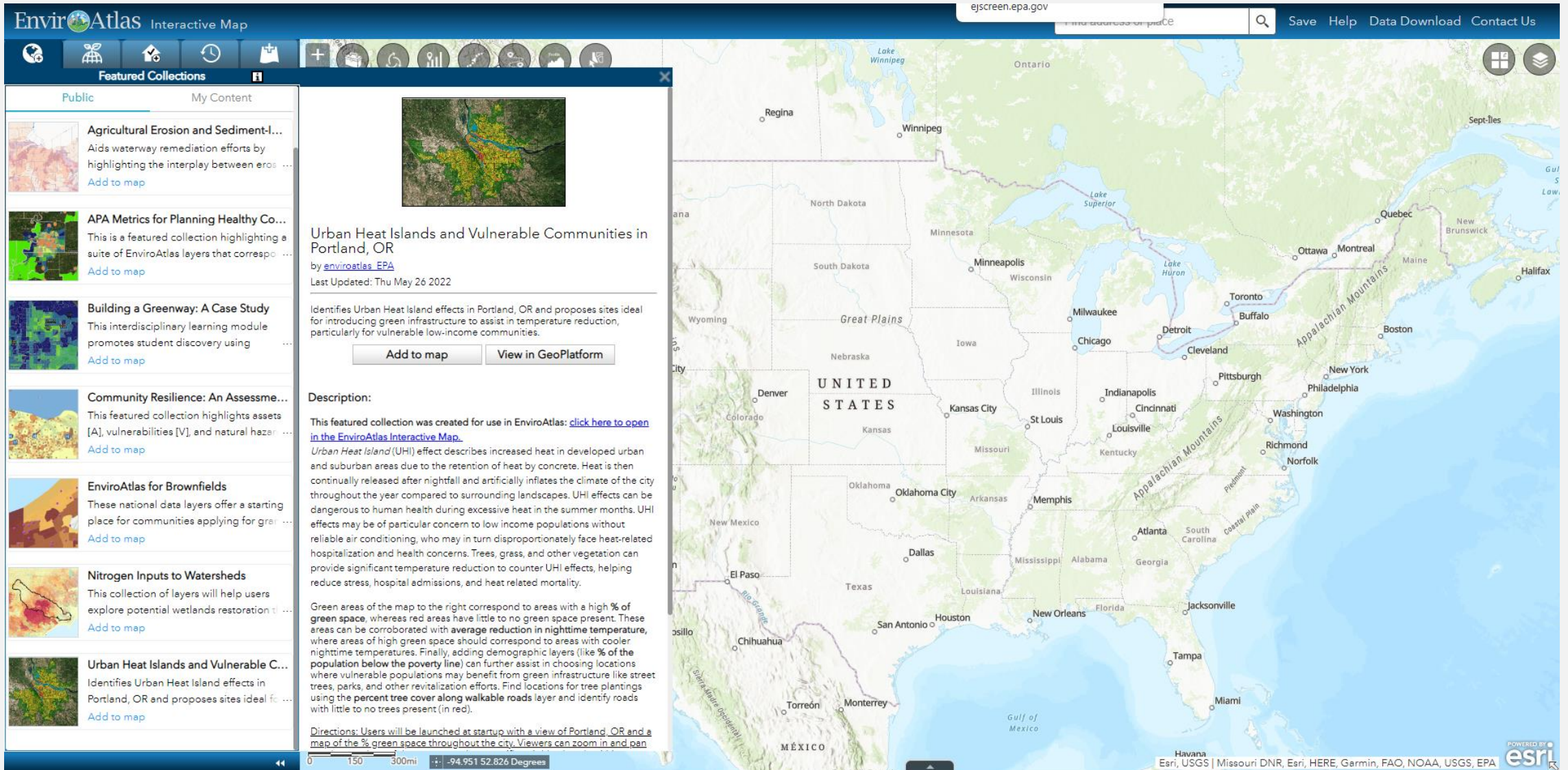
EnviroAtlas – EJScreen Demographic Index overlaid with RCRA Hazardous Waste Sites, Superfund Sites, and Impaired Waters



EnviroAtlas – Average reduction in daytime temperature due to tree cover, overlaid with percent with income below twice the poverty level



EnviroAtlas – Featured collection illustrating urban heat islands in the context of vulnerable communities



The screenshot shows the EnviroAtlas Interactive Map interface. The top navigation bar includes the EPA logo, the text "EnviroAtlas Interactive Map", a search bar, and links for "Save", "Help", "Data Download", and "Contact Us". Below the navigation bar is a toolbar with various map interaction icons. The main content area is divided into a left sidebar and a main map area.

Featured Collections Sidebar:

- Public** / My Content
- Agricultural Erosion and Sediment-I...**: Aids waterway remediation efforts by highlighting the interplay between eros... [Add to map](#)
- APA Metrics for Planning Healthy Co...**: This is a featured collection highlighting a suite of EnviroAtlas layers that correspo... [Add to map](#)
- Building a Greenway: A Case Study**: This interdisciplinary learning module promotes student discovery using... [Add to map](#)
- Community Resilience: An Assessme...**: This featured collection highlights assets (A), vulnerabilities (V), and natural hazar... [Add to map](#)
- EnviroAtlas for Brownfields**: These national data layers offer a starting place for communities applying for gra... [Add to map](#)
- Nitrogen Inputs to Watersheds**: This collection of layers will help users explore potential wetlands restoration t... [Add to map](#)
- Urban Heat Islands and Vulnerable C...**: Identifies Urban Heat Island effects in Portland, OR and proposes sites ideal fo... [Add to map](#)

Main Content Area:

Urban Heat Islands and Vulnerable Communities in Portland, OR
 by [enviroatlas.EPA](#)
 Last Updated: Thu May 26 2022

Identifies Urban Heat Island effects in Portland, OR and proposes sites ideal for introducing green infrastructure to assist in temperature reduction, particularly for vulnerable low-income communities.

[Add to map](#) [View in GeoPlatform](#)

Description:

This featured collection was created for use in EnviroAtlas: [click here to open in the EnviroAtlas Interactive Map.](#)

Urban Heat Island (UHI) effect describes increased heat in developed urban and suburban areas due to the retention of heat by concrete. Heat is then continually released after nightfall and artificially inflates the climate of the city throughout the year compared to surrounding landscapes. UHI effects can be dangerous to human health during excessive heat in the summer months. UHI effects may be of particular concern to low income populations without reliable air conditioning, who may in turn disproportionately face heat-related hospitalization and health concerns. Trees, grass, and other vegetation can provide significant temperature reduction to counter UHI effects, helping reduce stress, hospital admissions, and heat related mortality.

Green areas of the map to the right correspond to areas with a high % of green space, whereas red areas have little to no green space present. These areas can be corroborated with average reduction in nighttime temperature, where areas of high green space should correspond to areas with cooler nighttime temperatures. Finally, adding demographic layers (like % of the population below the poverty line) can further assist in choosing locations where vulnerable populations may benefit from green infrastructure like street trees, parks, and other revitalization efforts. Find locations for tree plantings using the percent tree cover along walkable roads layer and identify roads with little to no trees present (in red).

Directions: Users will be launched at startup with a view of Portland, OR and a map of the % green space throughout the city. Viewers can zoom in and pan

The main map area displays a map of the United States with various cities and geographical features labeled. The map is currently centered on the United States, showing major cities like Chicago, New York, and Los Angeles. The map interface includes a scale bar at the bottom left (0 to 300 miles) and a coordinate display (-94.951 52.826 Degrees). The bottom right corner of the map area features the text "POWERED BY" and the Esri logo, along with a list of data providers: Esri, USGS, Missouri DNR, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA.

EnviroAtlas Educational Module – Considering Environmental Justice in Building a Greenway

EnviroAtlas

CONTACT US

EnviroAtlas Home

About Us

Ecosystem Services

Frequent Questions

Project Status

Web Apps

Interactive Map

Eco-Health Browser

How to Use

Tutorials

Example Uses

For Brownfields

Health Impact Assessment

Data

About the Data

Dynamic Data Matrix

Download

Resources & Publications

Educational Materials

Fact Sheets

Publications

Technical Resources

GIS Toolboxes

Related Links

Building a Greenway: A case study

Case Study Overview

These interdisciplinary learning modules promote student discovery using available maps and data, engaging students to be collaborative decision-makers. These case studies are intended for secondary education, undergraduate, and community education/engagement programs. There are two case study activities available here: (1) The original Greenway activity gives educators the option to assign stakeholder roles, and (2) the EJ Greenway adaptation includes additional environmental justice concepts and students must take on one of the provided stakeholder roles.

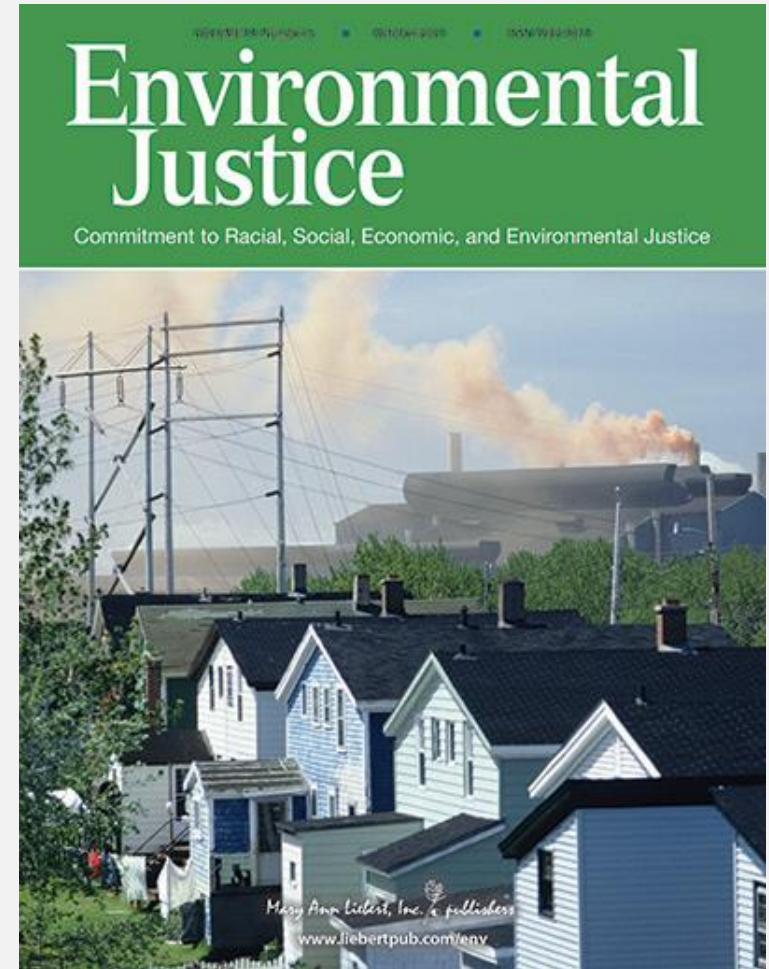
	(1) Building a Greenway: A Case Study	(2) Considering Environmental Justice in Building a Greenway NEW
For Teachers	<ul style="list-style-type: none"> Greenway: Teacher Guide (pdf) Greenway: PowerPoint for Teacher Use (pdf) Greenway Powerpoint Script (pdf) 	<ul style="list-style-type: none"> EJ Greenway: Instructor Summary Sheet & Master Links (pdf) PowerPoint Slides and Script - coming soon
Student Handouts	<ul style="list-style-type: none"> Greenway: Case Study Synopsis (pdf) Greenway: Student Map Set (pdf) Greenway: Understanding Maps Worksheet (pdf) Greenway: Student Stakeholder Roles (pdf) (optional) Greenway: Glossary (pdf) (optional) 	<ul style="list-style-type: none"> EJ Greenway: Participant Instruction Sheet & Master Links (pdf) EJ Greenway: Background Reading (pdf) EJ Greenway: Student Map Set (pdf) EJ Greenway: Understanding Maps Worksheet (pdf) EJ Greenway: Stakeholder Roles (pdf) EJ Greenway: Glossary & References (pdf)



Empowering Environmental Justice Decision Makers: Increasing Educational Resources for US Environmental Protection Agency's Mapping Tools

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Conclusion

- EJScreen is an environmental justice mapping and screening tool. Its sole purpose is environmental justice.
- EnviroAtlas is a mapping tool built around the concept of all the benefits we receive from nature. It can be used in an environmental justice context.
- The tools can be used separately or together.
- The data from EJScreen can be easily viewed in EnviroAtlas and vice versa.

Conclusion

I am interested in	EJScreen	EnviroAtlas
Screening for environmental justice	X	
Environmental justice indices	X	
A specific environmental or demographic dataset	X	X
Environmental assets and environmental justice		X
Linkages between ecosystems and human health and EJ		X
Viewing data in an easy-to-use map	X	X
Overlaying demographic variables over environmental variables	X	X

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