



Water Justice

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| Lesson Plan for Grades: 9 - 12 |
| Length of Lesson: 90 minutes |
| Authored by: UT Environmental Science Institute |
| Date created: 10/19/2021 |
| Subject area/course: <ul style="list-style-type: none">• Environmental Science, Environmental Justice, U.S. History, Sociology |
| Materials: <ul style="list-style-type: none">• Computer with internet access |
| TEKS/SEs: <p>§113.41. United States History Studies Since 1877</p> <p>(14) Geography. The student understands the relationship between population growth and the physical environment: and</p> <p>(B) Identify the roles of governmental entities and private citizens in managing the environment such as the establishment of the National Parks System, the Environmental Protection Agency (EPA), and the Endangered Species Act.</p> <p>(3) History. The student understands the political, economic, and social changes in the United States from 1877 to 1898. The student is expected to:</p> <p>(C) analyze social issues affecting women, minorities, children, immigrants, and urbanization.</p> <p>§113.46 Sociology</p> <p>(19) Social studies skills. The student applies critical-thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology. The student is expected to:</p> <p>(A) analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions; and</p> <p>(20) Social studies skills. The student communicates in written, oral, and visual forms. The student is expected to:</p> <p>(C) transfer information from one medium to another, including written to visual and written or visual to statistical, using computer software as appropriate; and</p> |
| Lesson objective(s): <ul style="list-style-type: none">• Students will be able to use a GIS database to identify and discuss environmental justice concerns of notable case studies and their community. |
| Differentiation strategies to meet diverse learner needs: <ul style="list-style-type: none">• Students can collaboratively work in groups to assist each other with lessons and complement each other's strengths.• Students and educators should refer to https://www.epa.gov/ejscreen/learn-use-ejscreen for additional assistance. |



Water Justice

ENGAGEMENT (5 minutes)

- Ask the students to consider the following questions. Assign yes and no sides of the room. Students walk to the side that matches their answer.
- “Is our school within 1 mile of a highway or a freeway?”
- “Is our school near an airport with lots of planes flying overhead?”
- “Do you think there are any other major sources of pollution near our school?”

End activity, have students return to seats and ask the following:

- *If you answered no to any or all of these questions, do you know where these things are? Do people live, work, and go to school near them?*
- Define **Environmental Justice**:
 - The fair treatment and meaningful involvement of all people with respect to the development, implementation and enforcement of environmental laws, regulations and policies (epa.gov).
- For this activity students will use the EJSCREEN (Environmental Justice Screening and Mapping Tool). The tool was created by the Environmental Protection Agency (EPA) in order create a mapping tool that uses nationally consistent data to monitor Environmental Justice metrics in order to support the EPA’s goal of protecting public health and the environment (epa.gov).

EXPLORATION (50 minutes)

The exploration activities are described in detail in the *Exploration: Student Handout*. Depending on time and goals, have students do Part A, Part B, or both.

Introduction of terminology (10 minutes)

- Assign students to groups of two. Assign each team 1 - 2 of the 12 environmental indicators listed on Table 1 of the *Exploration: Student Handout*.
 - Have teams go to the EJSCREEN overview of environmental indicators at <https://www.epa.gov/ejscreen/overview-environmental-indicators-ejscreen>. Each team will review the *details* column in the *Summary Table of Environmental Indicators and Data Sources* to share with the class the EPA definition for their assigned indicator(s).
 - Teams should share a brief summary of what information their category is conveying, defining any unfamiliar terminology in the process.
 - Take time to ensure students understand what measurement is being recorded in the EPA definition for each category.
 - Definitions should be shared on the board or on a Google Doc to ensure all teams have access.



Water Justice

Part A (20 minutes, See Exploration: Student Handout):

- Assign half the teams to Region “A” and the other half to Region “B”.
- Teams will use EJSCREEN Environmental Justice Screening and Mapping Tool to explore their assigned region and the EJSCREEN GIS mapping software to explore demographic, environmental, and environmental justice data for their assigned region.

Part B (20 minutes, See Exploration: Student Handout):

- Students will use EJSCREEN Environmental Justice Screening and Mapping Tool to explore their school and surrounding community and the EJSCREEN GIS mapping software to explore demographic, environmental, and environmental justice data for the school community.

EXPLANATION (15 minutes)

- Choose an appropriate number of questions depending on available time.
- Teams will share their findings from part A.

Region A and B:

- *“What are some environmental challenges the people who live in Region A/B face?”*
- *“What are some environmental categories that are exceptionally healthy and safe for the people in Region A/B?”*
- *“How does or doesn’t region A/B exhibit issues related to health, environment, and environmental justice?”*
- *“In what ways is Region A similar to Region B. In what ways is it different?”*
- *“What steps could we take to make the health, safety and environment more equitable for the people living in the regions we looked at?”*

School:

- *“What are some environmental challenges present in our area?”*
- *“What are some environmental categories that are exceptionally healthy and safe around us?”*
- *“How does or doesn’t the area around our school exhibit issues related to health, environment, and environmental justice?”*
- *“In what ways is our area similar to Regions A and B. In what ways is it different?”*
- *“What steps could we take to make the health, safety and environment more equitable for the people living in our area?”*

- *“Is it possible to ensure nobody lives conditions that are unhealthy due to environmental injustice? If yes, how could we achieve that? If no, why not?”*



Water Justice

ELABORATION (15 minutes)

The elaboration activities are described in detail the *Elaboration: Student Handout*.

- See below for examples of successful environmental justice activism.
- Provide biographical information on inspiring people who worked to improve their communities.
- Give resources to get involved or learn more.
- Good Texas examples to use:
 - Region A and more <https://drrobertbullard.com/biography/>
 - Region A <https://earthjustice.org/brief/2020/civil-rights-victory-in-texas-is-a-model-for-environmental-progress-nationwide>
 - Region B <https://www.texasobserver.org/one-hundred-years-ago-a-flood-reshaped-san-antonio-a-new-book-shows-how-little-has-changed/>

EVALUATION (throughout entire lesson)

- What conclusions are the students able to draw from researching the two case studies? Were they able to extend and apply that process to researching their school's community?

SOURCES AND RESOURCES

- Dr. Kimberly Jones, *Hot Science at Home* #1.11, "Water Justice", <https://www.esi.utexas.edu/talk/water-justice/>
- EJSCREEN EPA's Environmental Justice Screening and Mapping Tool, <https://ejscreen.epa.gov/mapper/>
- EJSCREEN User Guide 2020, https://ejscreen.epa.gov/mapper/help/ejscreen_help.pdf
- Dr. Robert Bullard Father of Environmental Justice, <https://drrobertbullard.com/biography/>
- Texas Observer, "One Hundred Years Ago, A Flood Reshaped San Antonio. A New Book Shows How Little Has Changed." <https://www.texasobserver.org/one-hundred-years-ago-a-flood-reshaped-san-antonio-a-new-book-shows-how-little-has-changed/>
- Earth Justice, "Civil Rights Victory in Texas is a Model for Environmental Progress Nationwide", <https://earthjustice.org/brief/2020/civil-rights-victory-in-texas-is-a-model-for-environmental-progress-nationwide>



Water Justice

EXPLORATION: STUDENT HANDOUT

Purpose: To use a GIS database to identify and discuss environmental justice concerns of notable case studies and their community.

Materials: Computer with internet access

Procedure:

Introduction of terminology (10 min.)

There are 12 environmental indicators listed on Table 1. Your team will be assigned 1 – 2 of the Environmental Indicators listed on this table. Your job is to come up with a definition of the term(s) which you will then share with the rest of the class.

- Use the *Summary Table of Environmental Indicators and Data Sources* to record the EPA definition for each of the indicators: <https://www.epa.gov/ejscreen/overview-environmental-indicators-ejscreen>. See the column labeled “Details” for the definition.
- Fill in a short definition of what is being measured for your assigned indicators on Table 1. If needed, provide additional definitions for unfamiliar terms.
- Be prepared to share the definition of your assigned indicator(s) with the rest of the class. As teams present their definitions, fill in the rest of Table 1.

Part 1 (40 min.): Comparing Two Regions

Your team will now use the EJSCREEN tool to gather information about a specific region in the U.S. Your teacher will assign you one of the two regions below.

Region A: Harrisburg/Manchester, Houston, TX

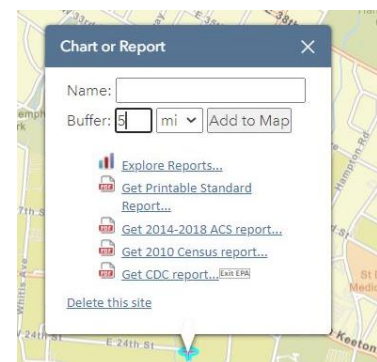
Region B: West San Antonio Bexar

Your team will fill in the rest of Table 1, by following the steps below:

- Access EJSCREEN at the following link <https://ejscreen.epa.gov/mapper/>
- Search for your assigned region using the search in the upper right corner. A small **pink cross** should appear.
- Click on the **pink cross**. A pop-up titled **Chart or Report** should appear.
- Enter **5** for **Buffer** and leave the units in **mi**
- Click **Add to Map** to see the area of interest.



Source: <https://ejscreen.epa.gov/mapper/>



Source: <https://ejscreen.epa.gov/mapper/>



Water Justice

- Click on **Explore Reports...** A pop up should appear with three tabs and a bar graph.
- Select the tab labeled **Pollution and Sources**.



Source: <https://ejscreen.epa.gov/mapper/>

Look at the values for each category. The blue columns compare the selected region of interest to the rest of the U.S.

The national percentile tells you *what percent of the U.S. population has an equal or lower value*, meaning less potential for exposure/ risk/ proximity to certain facilities, or a lower percent minority.

This means if the blue column on the graph reads 85 for **Ozone**, people living in the area you are researching are exposed to more ozone than 85% of the country.

- Record the values for each of the categories under the Pollution and Sources column in Table 1 below.
- Select the tab labeled **Environmental Justice Indexes**.

Per the EPA guide: The EJ Index highlights block groups with the highest intersection of low-income populations, people of color, and a given environmental indicator. To calculate a single EJ Index the following formula is used:

$$\begin{aligned}
 \text{EJ Index} = & \\
 & (\text{The Environmental Indicator}) \\
 & \times (\text{Demographic Index for Block Group} - \text{Demographic Index for US}) \\
 & \times (\text{Population count for Block Group})
 \end{aligned}$$

Source: <https://ejscreen.epa.gov/mapper/>

This means population groups with high exposure to pollutants and a high low income or minority population will have a high EJ Index. Like the Environmental Justice Indicators, these values are reported as percentiles to allow comparisons to be made across communities.

- Record the values in the Environmental Justice Index column of Table 1 below.



Water Justice

Table 1

| Environmental Indicator | Pollution and Sources (USA Percentile) | Environmental Justice Index (USA Percentile) |
|---|---|---|
| Particulate Matter 2.5 | | |
| Ozone | | |
| 2017 Diesel Particulate Matter | | |
| 2017 Air Toxics Cancer Risk | | |
| Air Toxics Respiratory Hazards Index | | |
| Traffic Proximity | | |
| Lead Paint | | |
| Superfund Proximity | | |
| Risk Management Plan Facility Proximity | | |
| Hazardous Waste Proximity | | |
| Underground Storage Tanks (UST) and Leaking UST | | |
| Wastewater Dischargers Indicator | | |



Water Justice



Part 2 (20 min.): Environmental Justice Index in your neighborhood

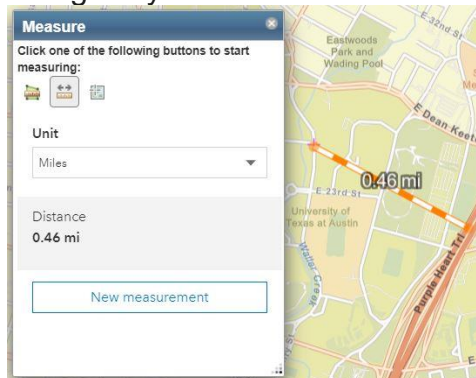
Your team will see the EJ index in your neighborhood.

- Close the **Explore Reports** and **Chart or Report** pop-ups.
- Enter the address of your school in the search bar.

Recall the discussion question from the beginning of class:

“Is our school within 1 mile of a highway or a freeway?”

- Using the Calculate the Distance feature, you will measure the distance in a straight line from your school to the nearest freeway or highway.
 - Click on the  **Measure** icon in the tools tab.
 - Select  **Calculate the Distance**
 - Click on your school.
 - Next, zoom out until you can see the nearest freeway or highway.
 - Use the tool to draw a straight line from your school to the highway. Double click on the highway to record a measurement.



Source: <https://ejscreen.epa.gov/mapper/>

- Record the distance: _____

“Do you think there are any hazardous waste facilities near our school?”

- Select the tool **Maps** tab.
- Select **EPA Regulated Facilities**.
- Under pop up menu check the boxes next to **Superfund, Water Dischargers, Air Pollution, Hazardous Waste, and Brownfields**



Water Justice

Identify the facility of each category that is closest to your school by clicking on the small square of the corresponding color that has appeared on the map, or record "NA" if there are none in the general area.

Superfund

Name of site: _____

Hazardous Waste

Name of site: _____

Water dischargers

Name of site: _____

Air Pollution

Name of site: _____

Brownfields

Name of site: _____

Refer to group discussion questions listed in the **Explain** section at the beginning of this document.



Water Justice

ELABORATION: STUDENT HANDOUT

Purpose: Dig deeper into the assigned communities and discover what steps can be taken to make them healthier for the people that live there.

Materials: Computer with internet access

Procedure:

- Find additional information on the area your team researched in Part 1, including: is there any information online sharing insights as to what caused the issues (for example, a company illegally dumped toxic waste, etc.), as well as any actions taken by the people that live there in order to protect their environment and health. You can use the links below to get started:
 - Both: <https://drrobertbullard.com/biography/>
 - Region A: <https://earthjustice.org/brief/2020/civil-rights-victory-in-texas-is-a-model-for-environmental-progress-nationwide>
 - Region B: <https://www.texasobserver.org/one-hundred-years-ago-a-flood-reshaped-san-antonio-a-new-book-shows-how-little-has-changed/>

How does the article relate to the data you found during the exploration activity? Does the article relate to any of the issues you discovered? Does anything about the article surprise you? Be specific and provide examples.

What has the community done to respond? What successes have they accomplished? What challenges to they continue to face?

Think about any of the issues you found when you researched data for your school. Try to find an article or a group's website that discusses actions that have been taken or can be taken to help resolve the issue and make your school's community a healthier place. Record what you find.



The University of Texas at Austin
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