



## **Introducing Students to Environmental Justice: A North Carolina Case Study**

### **Overview**

In this activity, students will be introduced to environmental justice by considering a North Carolina case study<sup>1</sup> that involved a hazardous waste landfill and is often credited with launching the national environmental justice movement. This lesson follows the 5E inquiry model, using engagement, exploration, explanation, elaboration, and evaluation to promote student learning.

### **Alignment to North Carolina Standard Course of Study for Science**

This lesson addresses the Science in Personal and Social Perspectives strand along with specific learning objectives:

#### **8<sup>th</sup> Grade Science**

Objective 3.07: Describe how humans affect the quality of water:

- Point and non-point sources of water pollution in North Carolina.
- Economic trade-offs.
- Local water issues.

Objective 3.08: Recognize that the good health of environments and organisms requires:

- Monitoring of the hydrosphere.
- Water quality standards.
- Methods of water treatment.
- Maintaining safe water quality.
- Stewardship.

Objective 4.01: Understand that both naturally occurring and synthetic substances are chemicals.

Objective 4.08: Identify evidence that some chemicals may contribute to human health conditions.

Objective 4.10: Describe risks and benefits of chemicals.

#### **Biology**

Objective 4.04: Analyze and explain the interactive role of internal and external factors in health and disease.

Objective 5.03: Assess human population and its impact on local ecosystems and global environments.

#### **Earth and Environmental Science**

Objective 1.06: Identify and evaluate a range of possible solutions to earth and environmental issues at the local, national, and global level.

Objective 4.04: Evaluate water resources:

- Environmental impacts of a growing human population.
- Causes of natural and manmade contamination.

#### **Alignment to North Carolina Standard Course of Study for Civics and Economics**

Objective 6.05: Investigate the role and responsibility of government to inform the citizenry.

Objective 9.08: Analyze the influence of environmental factors, economic conditions, and policy decisions on individual economic activities.

Objective 10.05: Describe examples of recurring public problems and issues.

#### **Essential Questions**

- What is environmental justice?
- Why should the general public be informed about local hazardous waste sites?
- How does science inform a community's response to an environmental justice issue?
- What federal, state, and local agencies exist to protect the environment and human health?

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<sup>1</sup> Case study written by [The Exchange Project](#) in UNC's Gillings School of Global Public Health.

## Materials

- Copies of *Real People-Real Stories: Seeking Environmental Justice - Afton, NC (Warren County)*, one per student
  - Download Brief Summary (4 pages) at: [http://www.exchangeproject.unc.edu/real-people\\_sub/by\\_county.html](http://www.exchangeproject.unc.edu/real-people_sub/by_county.html)

## Teacher Preparation

To prepare for this lesson, you may choose to read the complete Afton, NC case study, available for download at: [http://www.exchangeproject.unc.edu/real-people\\_sub/by\\_county.html](http://www.exchangeproject.unc.edu/real-people_sub/by_county.html). You will also want to be prepared to provide a definition of environmental justice (EJ) during the lesson. The [EPA](#) defines EJ as “*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.*” Citing local examples of recent environmental justice issues can help your students to understand the relevance of this movement to their lives.

## Student Preparation

This activity could be preceded by a discussion about chemicals in the environment, including hazardous chemicals and their disposal, routes of human exposure (e.g., via air, water, food) to chemicals, and landfill design to prevent groundwater contamination.

## Duration

60-90 minutes depending on length and depth of class discussion

## Procedure

### ENGAGEMENT

1. Provide copies or read the following excerpt to your class, and ask students if they can identify any community concerns that might arise as a result of this situation.

“Over 30,000 gallons of industrial waste containing the hazardous chemical polychlorinated biphenyl or PCB were deliberately discharged along approximately 243 miles of highway shoulders in 14 counties of North Carolina. Because of the quantity of soils involved and the distances to approved landfills, the State has decided to construct a new landfill in order to dispose of this hazardous waste.”

“Let’s imagine that we live in a small town where the population is approximately 1,300. Sixty-nine percent of the residents are nonwhite and 20 percent of the residents have incomes below the federal poverty level. The town is an economically-depressed community. A 142-acre tract of land on the east side of town has been identified by the state as the resting place for the 60,000 tons of soil highly contaminated with PCBs. PCBs are a class of chemicals that have been determined to be hazardous to human health and reproduction. This PCB-contaminated soil will be placed into a hazardous waste landfill, as permitted by EPA regulations, which will not be used for the disposal of other wastes. The EPA eliminated the following requirements in order for the landfill to be built here: requirement for 50 feet between the landfill and groundwater, requirement of an artificial liner, requirement of an underliner leachate collection system.”

**Conclude any class discussion by revealing the problem to be addressed by this activity: community leaders who are upset about this situation believe that the landfill site was intentionally selected due to its being located in a poor, rural, predominantly minority community. They are determined to fight this decision and prevent the landfill from being constructed.** Tell the students that now they are going to consider this story from different perspectives and identify the various groups who are involved in this story and will identify actions each group can take to address this problem and predict how this story might end.

### Variation:

Although the format of this lesson as written invites students to discover the definition/concept of environmental justice later in the lesson, you may choose to introduce the concept now by conducting steps 9 and 10 before proceeding.

### EXPLORATION

2. Draw a [“T” chart](#) on the board; draw a “+” sign in the left hand column of the chart and a “-” sign in the right hand column. Ask the class to consider how the community might be both positively and negatively affected by the [siting and construction](#) of the PCB Landfill. *Do not worry about right or wrong answers, just record ideas based on what students know.*

Students might need to be prompted to consider the potential positive and negative effects of this landfill on:

- The local economy (job opportunities)
- Society/Social well-being (living conditions)
- Public health
- Overall community infrastructure (schools, roads, emergency services, etc.)

3. Next, ask the students to identify the key groups in this story and brainstorm actions each key group (see list below) could take to address this problem. *At this point, do not worry about right or wrong answers, just record actions based on what students know about each group – it is not important that they come up with lots of answers for each group.*

Record student answers on the board and conclude by asking the class to predict reasonable solutions to this problem:

- Concerned Citizen Group(s) e.g., those who live near the proposed site
- Media
- Scientists/Public Health Experts
- EPA (Federal Government)
- NC Department of Natural Resources (State Government)
- Town and County officials (Local Government)

### Variations

- **Carousel Brainstorm:** Post a piece of chart paper for each group around the room; divide students into 6 groups and ask them to spend a few minutes at each chart paper brainstorming. Once students have had time to visit each piece of paper, review students ideas for each group as a class before proceeding.
- **Small Group Discussion:** Divide the class into six groups and assign each group to represent one of the groups above; ask each group to brainstorm actions their group could take to address this problem; students should be prepared to share their answers with the rest of the class.

### EXPLANATION

4. Tell the students that the scenario they just envisioned actually happened in North Carolina and invite students to read the summary titled *Real People-Real Stories: Seeking Environmental Justice - Afton, NC (Warren County)* to find out the outcome of this story and how these various groups responded. Download the summary at: [http://www.exchangeproject.unc.edu/real-people\\_sub/by\\_county.html](http://www.exchangeproject.unc.edu/real-people_sub/by_county.html)
5. Once students have read the summary, allow students to evaluate how closely their brainstormed ideas of group actions from step 3 matched what was actually described in the story. This may provide you with the opportunity to emphasize the different and sometimes collaborative roles played by each group in the actual case study.
6. (*Optional*) If relevant to the discipline you are teaching, prompt a discussion of the scientific principles that are addressed by this case study or ask students to complete a worksheet containing some or all of the following questions:
- What are PCBs used for? Describe risks and benefits of hazardous industrial chemicals.
  - What was the evidence that PCB-contaminated soil may have impacted human health conditions?
  - What were the water quality issues that this community faced as a result of this landfill?
  - How was water quality monitored at the site?
  - Was the leaking landfill an example of point or non-point source pollution?
  - What features (or lack thereof) of the PCB landfill resulted in dioxin contamination of groundwater?
  - How does this story connect to the larger problem of a growing human population?
7. Next, revisit the “T” chart on the board; ask the class to reflect on how the community of Afton was both positively and negatively affected by the PCB landfill. Ask students to compare their previous predictions from step 2 with what actually occurred.
8. Next, ask the class to describe the demographics (race/ethnicity, income, age, employment statistics, education level, etc.) of the community affected. Ask the class to discuss the evidence that race and income level were used as criteria for siting the landfill in Afton, NC.

### ELABORATION: DEFINING ENVIRONMENTAL JUSTICE

9. Conclude this activity by introducing the phrase *environmental justice* and asking students to speculate on its meaning; list student ideas on the board for all to consider. Circle words or concepts that are repeated to help students work towards developing their own definition of environmental justice.

10. Finally, reveal EPA's definition of environmental justice (EJ) as *"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."* You may want to elaborate on Environmental Justice by offering the [17 Principles of EJ](#) that "have served as a defining document for the growing grassroots movement for environmental justice." These principles were adopted by the delegates at the First National People of Color Environmental Leadership Summit held in October 1991.
11. Conclude by asking some or all of the following (*answers will vary, some answers to look for are mentioned below*):
- Why should the general public be informed about local hazardous waste (HW) sites and what should the role of government be in this process?
    - *HW sites can lead to contaminated ground and surface water, which can affect drinking water quality and local wildlife.*
    - *Clean up of HW sites can impact local communities and wildlife.*
    - *Government agencies should inform the public of HW sites and should provide accessible resources for citizens concerned about exposure and impacts.*
  - What federal, state, and local agencies exist to protect the environment and human health?
    - *EPA, NCDENR, NCDHHS, County Health Departments*
  - What strategies can community members use to address environmental injustices?
    - *Review the strategies used by the Afton community.*
  - How does science inform a community's response to an environmental justice issue?
    - *Informs community members about potential hazards and their health effects.*
    - *Provides evidence for activists to use in advocating for their rights.*
    - *Quantifies health problems.*
  - How might youth be affected by environmental injustices?
    - *Youth living near HW sites can be exposed to chemicals in contaminated drinking water or food (e.g., fish).*
    - *Parents' jobs might be affected by HW site and/or its remediation.*
  - What is the role of youth in addressing environmental injustices?
    - *Youth can become civically engaged and attend public hearings, submit public comments, etc.*
    - *Youth can help to educate others.*
  - Can you think of a local issue (past or present) that has negatively affected a particular subset of the population?
    - Describe the role of the state and/or local government in addressing this issue. What could these agencies have done differently? Are they doing anything to currently address the situation?

### **EVALUATION: FOLLOW-UP ACTIVITIES**

- Have students debate the case study during a "town hall meeting" with all of the key players (e.g., media, community, company/polluter, EPA, etc.) at the meeting. Ask students to read the [detailed case study](#) (available on Exchange Project's website) and perhaps review related (PCB contamination) cases to adequately prepare their parts for the debate.
- Have student groups assume the role of scientists and ask them to prepare a presentation for the citizens of Afton, NC informing them about PCBs, dioxins, and the hazards associated with these chemicals.
- Invite someone who works in the EJ community to visit the class and discuss a local past or present EJ issue. This could include the siting of a landfill or wastewater treatment plant, a Confined Animal Feeding Operation (CAFO), etc. Have students compile questions for the speaker ahead of time.
- Ask students develop their own laws for ensuring environmental justice and then to conduct research to find out how close their proposed laws align with existing laws.
- Ask students to identify, conduct research and write or present about a local EJ issue.
- Ask students to conduct research and identify a community that successfully defeated a landfill (or other waste facility) siting and to compare the features and actions of this community with the community of Afton, NC. What characteristics of the community's response may have contributed to its successful defeat of the siting?

## **Additional Resources**

For Complete Warren County Case Study and Others throughout North Carolina

[http://www.exchangeproject.unc.edu/real-people\\_sub/by\\_county.html](http://www.exchangeproject.unc.edu/real-people_sub/by_county.html)

Warren County PCB Landfill Fact Sheet

[http://wastenot.enr.state.nc.us/WarrenCo\\_Fact\\_Sheet.htm](http://wastenot.enr.state.nc.us/WarrenCo_Fact_Sheet.htm)

EPA's NPL Site Narrative for PCB Spills (Warren County Site)

<http://www.epa.gov/superfund/sites/npl/nar464.htm>

EPA's Superfund Program

<http://www.epa.gov/superfund/>

UNC Superfund Research Program

<http://www.uncsrp.org/>

## **Environmental Justice Resources**

EPA's Environmental Justice in Waste Programs

<http://www.epa.gov/oswer/ej/index.html>

National Environmental Justice Advisory Council (NEJAC)

<http://www.epa.gov/environmentaljustice/nejac/index.html>

NIEHS Kids' Pages: Environmental Justice

<http://kids.niehs.nih.gov/justice.htm>

Principles of Environmental Justice

<http://www.ejnet.org/ej/principles.html>

NC Environmental Justice Network

[www.ncejn.org](http://www.ncejn.org)

Environmental Justice Case Studies throughout the US and the World

<http://www.umich.edu/~snre492/cases.html>