

Supplemental materials for
Teaching Environmental Social Justice: “My advice is to BE AWARE.”

Supplemental materials provided in the order introduced in the manuscript.

Note: There is only one item per page, even if it is only a link.

Table 1. Demographic breakdown in percentages of the 123 biology students (percentages may not add to 100 due to rounding).

Latinx/ Hispanic	Black	Asian/Pacific Islander	American Indian	White	Other / decline to state
58	28	4	2	1	6
Male	Female	Free and reduced lunch			
42	57	73			

Connecting to the *Next Generation Science Standards* (NGSS Lead States 2013)

*The following chart highlights the three featured lessons in this paper.

Standard: HS-LS2 Ecosystems: Interactions, Energy, and Dynamics The chart below makes one set of connections between the instruction outlined in this article and the <i>NGSS</i>. Other valid connections are likely; however, space restrictions prevent us from listing all possibilities.	
Dimensions	Classroom Connections
Science and Engineering Practices Constructing Explanations and Designing Solutions Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade-off considerations. Obtaining, Evaluating, and Communicating Information Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).	In response to air pollution in a local community, students create a Flipgrid video with thoughts on racial justice and advice for members of the community. Students used a text rendering strategy to help with comprehension of articles about people of color in science, how systemic racism impacts biodiversity, and environmental racism. Students collaborate with peers on a Google Jamboard and respond to prompts on a discussion board or in a Flipgrid video.
Disciplinary Core Ideas LS2.C: Ecosystem Dynamics, Functioning, and Resilience Moreover, anthropogenic changes (induced by human activity) in the environment — including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change — can disrupt an ecosystem and threaten the survival of some species.	Students view video, read article, and engage in discussion about the impacts of urban planning and air pollution on a local ecosystem.

LS4.D: Biodiversity and Humans Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.	Students compare biodiversity between urban and suburban areas and identify ways to improve the ecology, including identifying solutions to sustain biodiversity, in cities.
Crosscutting Concepts Stability and Change Much of science deals with constructing explanations of how things change and how they remain stable.	Students identify the changes over time in air pollution and biodiversity in local communities.
<i>Building Towards</i> Performance Expectation (PE listing with Clarification Statement and Assessment Boundary) HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.* [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]	

Connections to the *Common Core State Standards* (NGAC and CCSSO 2010)

ELA RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
Mathematics MP.2 Reason abstractly and quantitatively

Table 2. Social Justice Standards (SJS) addressed in these three lessons (Teaching Tolerance, 2020).

Number	Domain	Standard
1	Identity	Students will develop positive social identities based on their membership in multiple groups in society.
10	Diversity	Students will examine diversity in social, cultural, political and historical contexts rather than in ways that are superficial or oversimplified.
11	Justice	Students will recognize stereotypes and relate to people as individuals rather than representatives of groups.
13	Justice	Students will analyze the harmful impact of bias and injustice on the world, historically and today

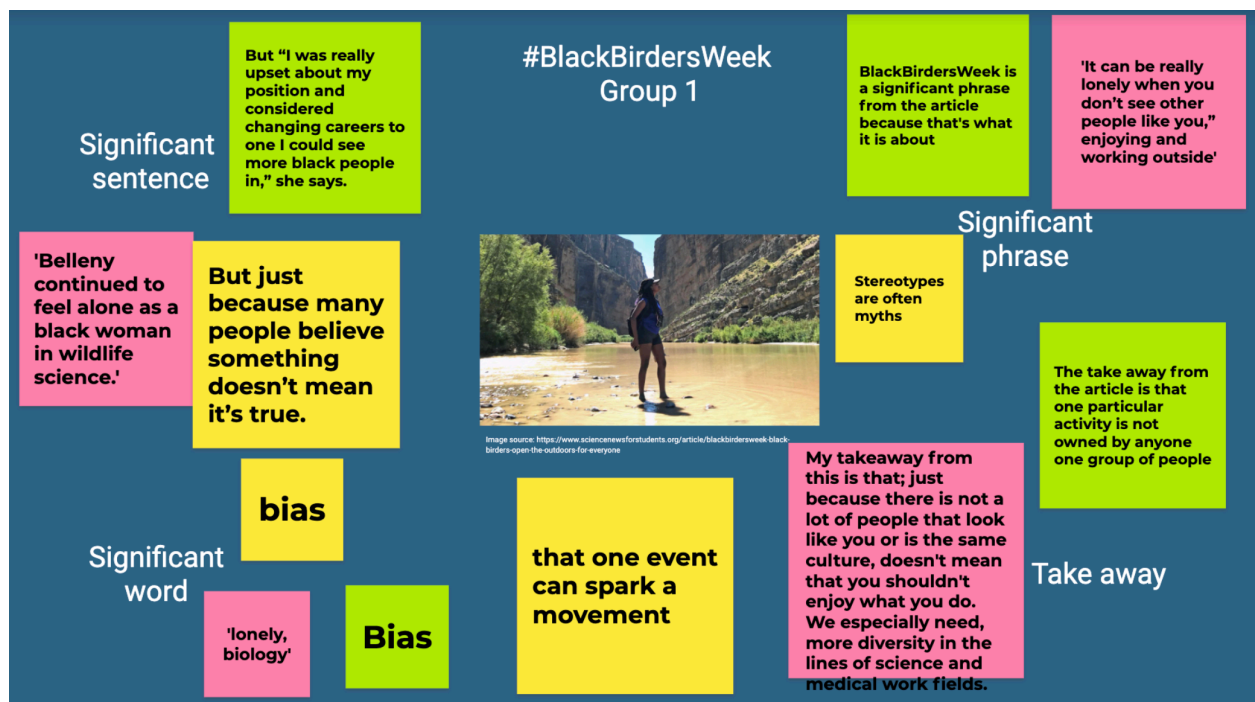
Link to #BlackBirdersWeek article

<https://www.sciencenewsforstudents.org/article/blackbirdersweek-black-birders-open-the-outdoors-for-everyone>

Table 3: Modified text rendering protocol for online learning. Original full protocol can be found at https://www.nsrharmony.org/wp-content/uploads/2017/10/TextRendering-N_0.pdf

Model	Teacher reads the first paragraph aloud and models a think-aloud to identify a sentence, phrase, and word.
Read	Teacher puts a digital timer on the screen. Students have the option to listen to the teacher read the text aloud or to turn off the sound and read the text silently.
Identify key ideas	Students select one sentence, one phrase, and one word that they find meaningful from the reading. Students type this into their digital notebooks.
Small groups	Students copy their selections onto a Google Jamboard in small breakout groups. Each student shares out loud or in the chat function of zoom. They explain what they selected and why.
Whole group	Teacher facilitates whole group discussion, summarizing trends in responses and how their responses help the class make meaning of the text.

Figure 1. Examples of student responses in Zoom breakout room during lesson 1. Note, this image was also submitted as a separate attachment at the proper dpi resolution.



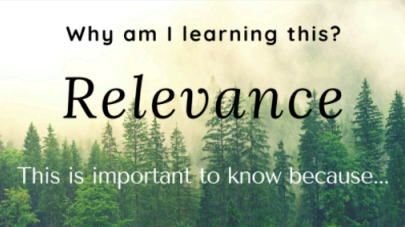
Link to Ted-Ed video Why is Biodiversity So Important?
https://www.youtube.com/watch?v=GK_vRtHJZu4&t=3s

Link to HHMI BioInteractive BiomeViewer simulation

<https://www.biointeractive.org/classroom-resources/biomeviewer>



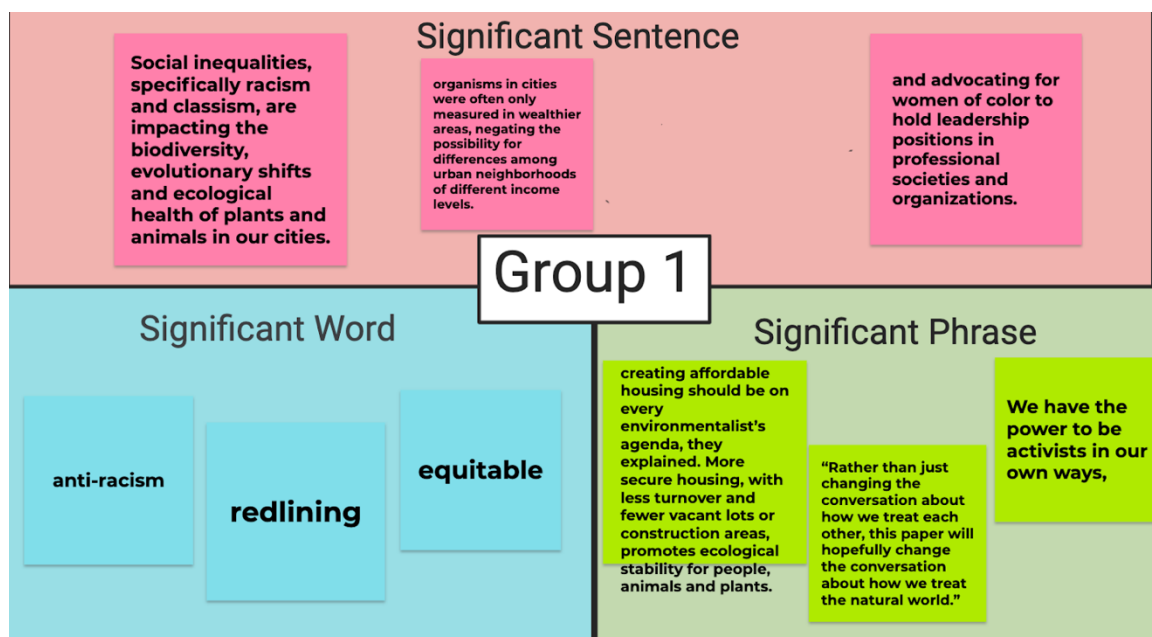
Figure 2. Preview of upcoming lesson to activate prior knowledge and prepare students for the lesson. Note, this image was also submitted as a separate attachment at the proper dpi resolution.

 Learning Intentions What will I be learning today?	 Success Criteria How will I know I am learning? I KNOW I AM SUCCESSFUL WHEN I CAN...	 Relevance Why am I learning this? This is important to know because...
Content: To understand how social inequality has impacted ecology and biodiversity of plants and animals in cities. Language: To explain the differences in environmental conditions depending upon the location. Social: Communicate with peers to identify significant sections of the text in order to discuss human impact.	□ Compare and contrast environmental conditions in a city. □ Discuss the ways in which social inequalities impact the environment (specifically biodiversity).	• Promoting anti-racism is important for science! • Our school is in an urban area. Have you thought about how biodiversity in our city might differ from other areas?

Link to article: *Systemic Racism has Consequences for All Life in Cities* article.

<https://www.washington.edu/news/2020/08/13/systemic-racism-has-consequences-for-all-life-in-cities/>

Figure 3. Example of student work on Google Jamboard during small group work in a Zoom breakout room. Note, this image was also submitted as a separate attachment at the proper dpi resolution.



Link to video: Systemic racism explained.

https://www.youtube.com/watch?v=YrHIQIO_bdQ

Link to video: How Systemic Racism Shaped Ecosystems in U.S. Cities

<https://www.sciencemag.org/news/2020/10/how-systemic-racism-shaped-ecosystems-us-cities>

Link to article: Environmental Racism and Asthma

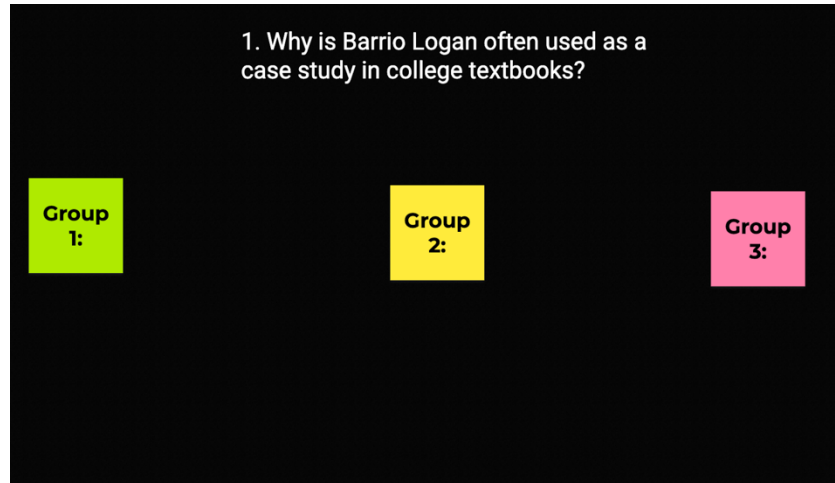
https://ihpsd.github.io/stories/environmental_racism_and_asthma.html

Figure 4. Graphic organizer for lesson 3.

Read the article, [Environmental Racism and Asthma: Looking Past Barrio Logan as A Public Health Case Study](#). Complete the graphic organizer as you read. Be ready to share your responses with your group.

Question	Response
1. Why is Barrio Logan often used as a case study in college textbooks?	<i>Barrio Logan is used as a case study in college textbooks because...</i>
2. The article states that individuals from the zip code that includes Barrio Logan are “having an asthma hospitalization rate higher than 92.9 percent of zip codes across California”. What are your reactions to this data?	<i>I feel...</i>
3. What are the potential causes of the increased amount of individuals in Barrio Logan having asthma? Considering what you’ve learned in this unit, how are these causes also threats to biodiversity of the area?	<i>The causes include...</i> <i>These causes are a threat to biodiversity because...</i>
4. The title of this article is Environmental Racism and Asthma: Looking Past Barrio Logan as A Public Health Case Study. How are the issues that the Barrio Logan community face an example of environmental racism ?	<i>This is an example of environmental racism because...</i>
5. What do you think needs to happen for there to be environmental justice for the people that live in Barrio Logan?	<i>For there to be environmental justice...</i>

In small groups, synthesize your individual responses to post 1 group response to each question on the class [Jamboard](#).



Now that you've had time to reflect on this issue in groups, prepare a response to the questions below to record on Flipgrid:

Prompt	Response
1. How have human actions impacted the Barrio Logan community?	
2. How might biodiversity be affected by this issue? Be sure to also explain what biodiversity is.	
3. How are the issues that the Barrio Logan community face an example of environmental racism ?	
4. What do you think needs to happen for there to be environmental justice for the people that live in Barrio Logan?	
5. What advice do you have for people in the community?	

Video:

Example of student Flip! video

https://drive.google.com/file/d/1BxUocSjYEEYnJTDuzRwvbVO-_JSmgt3uP/view?usp=sharing