Gullies in Barbados: Connecting Earth Science and History

Patricia Garvey

Subject(s): Earth Science, World History II
Driving Geography Theme: Human-Environment Interactions
Key Words: Gullies, Geology, Karst Topography, Ecosystems, Economy (Tourism, Crop Production)
Time Allotted: 90 minutes (+ additional project time, if desired)

Lesson Overview	This lesson focuses on the gullies of Barbados, because gullies offer a unique opportunity to consider environmental conservation in the face of historical activities. Though most of Barbados was clear-cut during the colonial era, gullies have remained because of their karst topography, making them too wet and too rocky for sugar cane production. Despite their small size, gullies house many of the island's native plants and animals. The gullies of Barbados are an interesting discussion in the interdisciplinary nature of history and the environment, making this lesson accessible to both social studies and science teachers. In this lesson, the students consider the connections between history and the environment, hear about Barbados and gullies, discuss a plant that is being destroyed by human activities, and then write about the conservation of gullies through a RAFT activity.
Compelling Question	How has the Earth (weather, topography, earth movements, water patterns, etc.) affected history?
Supporting Questions	Specifically, how has the geology of Barbados affected its development? **How has this development affected the existing environment of Barbados?**
Learning Objectives (2-3)	Student will be able to: 1) Identify Barbados on a map 2) Describe karst topography and explain how gullies are formed 3) Describe the role gullies play on the island of Barbados 4) Create a pros and cons list, and then use it to make a policy recommendation 5) Make an argument about the impact humans have on ecosystems like the one in the gullies of Barbados
C3 Standards & Practices	**D2.Geo.4.9-12.** Analyze relationships and interactions within and between human and physical systems to explain reciprocal influences that occur among them. **D2.Geo.6.9-12.** Evaluate the impact of human settlement activities on the environmental and cultural characteristics of specific places and regions.
Materials/ Resources (PPTS, Worksheets,	● Gullies Lesson Plan PowerPoint ● Student Guide

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Teacher Guides, Primary Sources, Etc.)	• Gullies Lesson Plan Plant Cards (either as paper or in original PowerPoint format) • Pencils / Paper OR Laptop Computers • Teacher Computer
Modifications/ Extensions	Within this lesson, students follow a step-by-step guide that corresponds with a teacher-led PowerPoint. Students have the opportunity to work as individuals, in small groups, and with the entire class. The lesson has a brief lecture portion to provide context for the case study of Barbados. If students have access to computers, this project could be modified for research or be made available in the form of a PearDeck (where students could move at their own pace). The RAFT activity at the end of the lesson could be extended into a full project or research project for individual / groups of students. The Plant Cards and the brochure from Welchman Hall Gully give students the opportunity to look at authentic materials from Barbados. For some classrooms, the teacher may want to assign students a plant / animal from the brochure. Or, the teacher may want to spend more time looking through the materials and discussing what they see in the photographs.

This lesson was inspired by a visit the **Welchman Hall Gully**. Using some of the resources collected from the site, students work through important questions about the connections between historical events and the environment. With a hypothetical introduction activity and a brief lecture, the lesson eventually culminates in a RAFT activity that can promote writing in geography, history, and environmental sciences. This lesson focuses on the interdisciplinary connections between history and the sciences, and the bridge that geography builds between the two disciplines.

While visiting Welchman Hall Gully, we learned about the significance of these pockets of land, and I thought that discussing the **conservation** of gullies with my students was vital to keeping gullies around for future generations. In order to fully grasp the purpose of this lesson, I offer the following discussion of gullies, including their origin, their historical importance, and their current state on the island of Barbados.

Gullies are small ravines that were created by the flow of water through limestone (**karst topography**). As a limestone island, Barbados has quite a few small gullies located around the island. Today, gullies make up five-percent of Barbados's land surface.

Though they only make up five-percent of the surface area, gullies protect the highest percentage of native species (of fauna and flora) and offer the most biologically diverse **ecosystems** on the island. According to Welchman Hall Gully, eighty-percent of the species found in gullies are considered native to Barbados.

In the 17th century, most of Barbados was **deforested** to produce sugar cane. Few areas of the island were not worth plowing in this extremely lucrative endeavor. The water-logged and rocky nature of gullies prevented them from being arable land. These geologic features can be credited with saving many of the indigenous plants and animals on the island of Barbados. And, theoretically, gullies would have been the only places with significant foliage cover in the 17th and 18th centuries, offering the only natural places to hide during the era of **slavery**.

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Unfortunately, it appears that most gullies on Barbados have become local dumping sites, acting as places where trash is almost invisible to the average passerby. As of 2018, it appears Barbados is still working out plans to create a national park, which may or may not include Welchman Hall Gully (as it is at the edge of plans and seems to be an important freshwater reservoir). The adjacent cave, Harrison's Cave, does appear to be listed as a protected site. Today, small, private entities like Welchman Hall Gully strive to preserve gullies through **tourism**.

Overall, gullies provide shelter for many native flora and fauna on the island of Barbados. Preserving these habitats has been difficult around the world, but Barbados has found that some of these areas can be preserved through tourism. This lesson seeks to help students better understand gullies and consider unique conservation efforts.

Teacher Preparation Instructions (explain lesson preparation steps)

- Have the PowerPoint up and running, beginning with the slide "Just Do It" so students can start working as they walk into the room.
- Give students their student guides at the beginning of class. This will give them a chance to look through the day's activities. Usually, I will put them out on the front desk to pick up as they walk in.
- If students have access to computers, post the Plant Cards and the Welchman Hall Gully Handout online for students to look at. If students do not have computers, print (preferably in color) one set of Plant Cards and several copies of the Welchman Hall Gully Handout for students to share.
- Have paper ready for the final activity (RAFT-ing).

Instructional Procedures/Process (Explain the instructional steps to your activity – write the directions for a general audience so that the lesson is easy replicate – provide sample talking points, etc.)

Objective #	***Description of Lesson Procedure***	**Check for Evidence of Understanding**
Just Do It (ob. 4)	*Ask students to close their books/computers before beginning class. Remind students to start the Just Do It as they come in.* Have the Student Guides available on students' desks (or at the front of the room) before they arrive. Ask them to complete the first part of the Just Do It as they come in. Once students seem to have completed the first portion of the Just Do It, continue to the What if… slide. Tell students to create a pros and cons list for the scenario. Walk around the room to see what students are writing. Encourage them to talk to their peers. Give students a one-minute warning, then have them change gears to their recommendation. If you have time, ask students to share their scenarios and recommendations	Students will be informally assessed on their Pros/Cons list and their ability to come up with a recommendation for a community. *At the end of class, you can choose to collect their packets to check for completion.*

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	(15 min)	
Transition: Share the day's schedule, standards, and guiding questions from the PowerPoint. Let students know that the day's work will move relatively quickly, so they should pay close attention…. If they get lost, they can always use the slide titles to catch up on the Student Guide. All slide titles are in **bold.** Many are <u>underlined</u> as well. (1 min)		
Consider This	Ask students to complete the Consider This section on their packet. Have them identify historical events that were affected by Earth Science and write a sentence connecting the two. You might use the following examples. *Hoping the air force would successfully decimate the British Army, Hitler halted his tanks before they reached Dunkirk. However, thick overcast weather, including dense fog, prevented the Luftwaffe from clearly seeing their British targets. The time and the cover that the weather offered allow the British to evacuate the vast majority of their troops from France.* OR *Pompeii was a thriving city until an eruption of Mt. Vesuvius buried the city in 79 AD. As a result of this eruption, the city was gone, but its bodies and its homes would remain preserved for centuries to come, allowing us to look into the past.* Fill in the slide of the PowerPoint with student examples. Then, ask students to consider the reverse. Work through this portion together. (14 min)	Students will be informally assessed on their contributions to discussions and their own responses to the prompts.
Transition: Ask students if they have any questions or remaining comments. Remind them to keep their student guides available. (1 min)		
Lecture Notes (ob. 1, 2, and 3)	Share the slides with the students. Build in time to allow for pauses and questions from the students. Make sure that they recognize the **bold** terms that should be put in the blank spaces in their notes. (Share any additional fun information that you can think of. Point out the pictures as you go.) (14 min)	Students will be informally assessed on their ability to follow along during a lecture and respond to prompts.
Transition: Ask students if they have any questions or comments. (1 min)		
The Case of the Creeping Charlie (ob. 3 and 5)	Read the description of the Creeping Charlie from the PowerPoint (from the Welchman Hall Gully handout). Point out the picture of the Creeping Charlie and *note that this picture shows the 6 by 6-foot plot of ALL of the Creeping Charlie left…* Prompt the students with the discussion questions. Add questions such as *How does this description*	Students will be informally assessed on their ability to discuss the purpose and effect of certain species. They will also be assessed on their ability to reflect on the value of something in nature.

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	make you feel? Tell students how you felt about the description. (14 min)	
Transition: Ask students if they have any questions. Present students with the Plant Cards and the Welchman Hall Gully handout. Give students some time to look through them and pick a favorite flora/fauna. Tell them to keep their favorite in mind or in hand (if you have enough available).		
RAFT (ob. 5)	If your class is already familiar with RAFT writing, quickly remind them what it is. If your class is not familiar, describe RAFT writing as, *"Role-playing writing. Where you take on a role and write about a particular topic that individual would care about. In order to do it, you have to consider your audience and the format you are going to write in. We will be going through step by step with some potential examples you could use."* Walk students through each of the slides. Encourage students to use the bottom of their page as outline space. When ready, give students extra paper and time to write individually. Share work, if desired. (24 min)	Students will be formally assessed on their RAFT writing.

Closure (Activity/Procedure that brings the lesson/activity back to the guiding questions)

- The closure activity is time dependent and definitely involves teacher choice. If you feel that students are finished with their RAFT writing and want to hear from them, give students the opportunity to share their work. Discuss their role, audience, format, and topic, then let them read their piece. Take a few minutes at the end of class to quickly touch on the "So what?" topics to remind them why you did this lesson.
- If you would rather let students work on their RAFT at home or they are not quite finished, spend some time working through the "So what?" questions with the class. Allow students to write on the board or even post sticky notes on the board answering one or two of the questions posed. The last question about a student's impact is especially important, because it reminds them of their power as young people.

Appendix

(All support materials are attached via email)