

Save Our Coral Reefs

A lesson differentiation & enrichment tool

Overview

Using this tool, students will practice and deepen their understanding of coral reef basics, what is contribution to their loss, and what is being done to preserve this resource.

Students will use the choice board and the resource list to work through (as independently as possible) short-cycle research, and then create two outcome products based on their choices.

Possible adaptations and extensions can be exercised by guiding the student choices and the level of support given during the process.

The goal is to allow a deepening of understanding without direct lecture, as the students guide themselves through the resource list and use small group and conference time to discuss.

Objectives

- Students will collect information from a variety of supplied or independent sources
- Students will compose writing, speaking, or visual evidence of learning about coral reef destruction
- Students will compose writing, speaking or visual evidence regarding human impact or solutions to coral reef destruction
- Students will share their artifacts of learning with the class

Subjects

Science, Writing



Grades 6-8

Time

One week of class periods for independent work

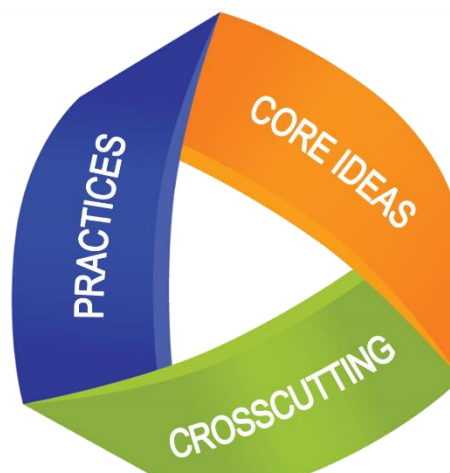
Vocabulary

Will vary depending on articles accessed, but basic vocabulary such as polyp, reef, ecosystem, bleaching, symbiosis, acidification, cnidaria, biodiversity, and mutualism should be included in the lesson introduction.

Standards		Middle School
<p>Next Generation Science Standards</p> 	Sample Performance Expectations met, depending on choices made on the board	<p>MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.</p> <p>MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and percapita consumption of natural resources impact Earth's systems.</p> <p>MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.</p> <p>MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.</p> <p>MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.</p>
	Sample Disciplinary Core Ideas met	<p>ESS3.C: Human Impacts on Earth Systems</p> <p>ESS3.D: Global Climate Change</p>
	Crosscutting Concepts (all can be incorporated in lesson)	<ul style="list-style-type: none"> • Patterns • Cause and Effect • Structure and Function • Stability and Change
	Science & Engineering Practices (all can be incorporated in lesson)	<ul style="list-style-type: none"> • Asking Questions + Defining Problems • Constructing Explanations and Designing Solutions • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information
<p>Common Core ELA</p> 	Writing	7
	Speaking & Listening	7
	Language Standards	6-8

Teacher Background

Three-Dimensional Learning refers to how the Next Generation Science Standards (NGSS) seeks to weave together the Science and Engineering Practices (SEPs), Crosscutting Concepts (CCs), and Disciplinary Core Ideas (DCIs) in student learning. Through the process of DOING science and engineering, students apply the Three Dimensions, helping them see the interconnections among disciplines as they develop their scientific, critical thinking, math, and English Language Arts (ELA) skills. This lesson provides a scaffolded exploration of the SEPs and CCs through the inclusion of graphic organizers that help students dig into the many important practices and concepts that scientists use in their investigations. This will help prepare students to conduct their own meaningful and reliable investigations and share their results with others in compelling ways.



The Three Dimensions of the Next Generation Science Standards (NGSS)

About the Choice Board: This is a differentiation tool for instructors teaching students about human impact and the value of biodiversity. The board is intended to differentiate content (with choice), as well as process and product. The assessment rubric scores only more general standards and includes credit for completion, so you will want to use this activity as a way to deepen understanding prior to the classroom assessment. It is designed so that each row is a different level of Bloom's taxonomy, therefore increasing in the demands of complexity, and each row is a different learning modality: writing, speaking, and finally, integrating art.

Preparation

- Read through and choose which items you prefer to use from the extensive resource list.
 - Gifted students may prefer access to the complete collection, while others will work better with 2 or so links per category.
- Decide how you'd like to direct the choices, based on your student population
 - You can give open choice to students.
 - Or, have students choose one green option and one blue option.
 - If you have gifted students, you may want to have them choose two green options as these are more complex options.
 - You can also consider allowing students who need a lot of additional support choose two blue options.

- You can also require students choose two different columns and rows, so that different modalities are considered as they work.
- All students will use the Shape of Life resource (which has its own embedded links) and the video in the center block. I recommend previewing the resource list and paring down to sites you feel best suit your students (maybe 2 or so per category). Include your textbook as a resource if you have one to use that has value.
- If you would like to integrate with your ELA staff, you can require note-taking and a bibliography as well. I do recommend a conversation about plagiarism and paraphrasing/quoting information in the projects.

Materials

- Choice boards in a digital and paper format for each student (so they can access resource links)
- Rubrics
- Computers with Internet connection (1 per student)
- Various art or poster supplies for the visual options
- Flipgrid account or some other way to share video responses for that option

Teaching Suggestions in the 5E Model

Engage/Explain

1. “Hook” students and introduce the lesson. (2–3 min.)
 - Show students a brief video of the problem of coral bleaching.
 - Here’s a good example:
<https://www.youtube.com/watch?v=efFNfxsOPoc>
 - Discuss coral reefs and share some photos, basic videos, etc.
 - Perform your vocabulary routine using the key vocabulary from the list. The emphasis should be on the human impact and of the impact of global climate change on the organism.

Explore/Extend/Enrich

2. Students Choose
 - Distribute the choice board and explain each item. Have students circle their choices.
 - Allow each of them to begin with the required block, the center. Pull small groups to explain the more complex choices more clearly, based on your professional opinion of how they should be constructed.
3. Work Time
 - I would give students a week to do these in class, culminating in a sharing day.

- First, have them commit to choices and note those choices on your recordkeeping sheet.
 - A simple table with names to the left and then a column for choices, then a column for anecdotal notes each day works well to stay on top of progress.
- Have “teacher check-in” conferences each day for the first 15 minutes or so, just looking over student progress so anyone lost is on your radar (consider a parent email if anyone is behind).
 - Make a note on your sheet.
- Run small groups
 - First, for your students who need support for at least the first two work days. Consider restricting one choice for them to the same project that you heavily support. Work through the resource information together, etc.
 - For each option that has students working within it, pull them for ten minutes or so every other day (you can get through 3/day easily) and let them discuss and ask questions
- Constantly circulate and check for understanding
- Conference with each student as often as possible
- If you would like to integrate with your ELA staff, you can require note-taking and a bibliography as well. I do recommend a conversation about plagiarism and paraphrasing/quoting information in the projects.
- Share on a Gallery Walk on the last day.
 - Hand up or set our projects
 - Give those with oral presentations time to show others

Evaluate

9. Conference during the process

Keep anecdotal notes and have conversations to gauge understanding

10. Students will present the results of their research projects to the class if they will be completing them.

- Provide a rubric such as the one at the end of the lesson so students know how they will be assessed.
- Completed projects can also be displayed on classroom and/or school walls.

11. Closing discussion / reflection (2 – 5 min.)

- Close with a discussion of coral reefs, the damage, and how it is being managed.
- Students can be asked to reflect on what they learned in the lesson by writing in their science notebooks. The graphic organizers that were completed during the lesson should also be added to their notebooks to be used for future reference.

Expand Knowledge + Skills

Coral Reef Choice Board Resource List

A copy exists in the student file, and can be edited as you wish for student use.

Background Information:

[Coral Reefs for Kids | Learn about the 3 types of coral reefs Fringe, Barrier and Atoll](#)

[Coral Reefs Ecology & Biodiversity](#)

[What Do Corals Reefs Need to Survive?](#)

[Slow Life: Time-Lapse on the Coral Reef | Smithsonian Ocean](#)

[What if all the coral reefs disappeared? | HowStuffWorks](#)

Video list: <https://florida.pbslearningmedia.org/resource/e740c41e-71a2-4c3e-85eb-c64534ca890c/coral-reef-ecology-videos/>

Problems:

[What Would Happen If All The Coral Reefs Died Off?](#)

[Coral Reefs — Global Issues](#)

[Threats to Coral Reefs | US EPA](#)

[Healthy Oceans: Coral Reefs and Climate Change | California Academy of Sciences](#)

[What is coral bleaching?](#)

[Coral bleaching 101 - coral bleaching explained | Great Barrier Reef Marine Park Authority](#)

Solutions:

[The world's coral reefs are dying—here's how scientists plan to save them](#)

[Saving Ocean Biodiversity: Coral Restoration | National Geographic Society](#)

[What You Can Do to Help Protect Coral Reefs | US EPA](#)

[Counting Coral](#)

[Ten Simple Things You Can Do To Protect Coral Reefs - Biosphere Foundation](#)

Global Climate Change:

[What Is Climate Change? | NASA Climate Kids](#)

[Climate change](#)

[Climate Change: Crash Course Kids #41.2](#)

Lesson written by Sandy Bean

[The Bean Center for Gifted Enrichment](#)

Name(s): _____

Date: _____

Coral Reef Choice Board

Instructions: Choose two items on the board as instructed. Each student must complete the center block.

<p>Explain two of the human impacts on coral reefs in a four paragraph essay. The essay should include an introduction that gives some basic facts, two body paragraphs and a conclusion.</p>	<p>Summarize two of the impacts of human activity on coral reefs in a speech to the class or a flipgrid video. Your video or speech should be at least two minutes in length. You may include some basic facts about coral reefs.</p>	<p>On a poster that is at least 18 x 24", list as many factors as you can that are contributing to the death of coral reefs. Use color and drawings to help emphasize your facts.</p>
<p>Evaluate several solutions for coral reef bleaching in a table or chart, listing the solution, and the pros and cons of each.</p>	<p>All Students: Read this article: Coral Bleaching the Shape of Life The Story of the Animal Kingdom</p> <p>And watch these videos: Coral Reefs 101 National Geographic</p>	<p>In your opinion, what is the best way for kids to help prevent coral reef damage?</p> <p>Create 3 posters to hang in your school that explain the problem and this solution.</p>
<p>Predict which solution will be the most effective in essay format. Include at least two reasons why you believe this solution is going to be the most successful.</p>	<p>Create a Kahoot of at least ten questions that tests your classmates' knowledge about global climate change over the past century.</p> <p>Include a study guide for students to read before the Quizlet.</p>	<p>Design a method of your own for preventing coral bleaching.</p> <p>Create a proposal you would take to the government in control of the area surrounding the Florida Keys. Your proposal should include drawings and a written explanation of your solution, as well as an estimated cost for the project. Include them in a packet with a title/cover page.</p>

Name(s): _____

Date: _____

Coral Reef Choice Board Rubric

Goal	Advanced (5)	Proficient (4.5)	Developing (4)	Beginning (3.5)
Student used resources from multiple links, integrating information	Student used resources from multiple links, integrating information, including advanced resources, and artfully integrated the information	Student used resources from multiple links, integrating information	Student used resources from multiple links, although the information may not be clearly integrated	Student used resources from one link
Student clearly demonstrated knowledge of human impact on coral systems.	Student clearly demonstrated advanced knowledge of human impact on coral systems. Instructions were followed and product is beyond expectations.	Student clearly demonstrated knowledge of human impact on coral systems. Instructions were followed.	Student demonstrated partial knowledge of human impact on coral systems. They may have few examples or limited details.	Student demonstrated limited or misinformed knowledge of human impact on coral systems.
Student clearly demonstrated knowledge regarding solutions to coral system problems, including a discussion on human impact.	Student demonstrated advanced knowledge regarding solutions to coral system problems, and proposed novel solutions regarding human impact.	Student clearly demonstrated knowledge regarding solutions to coral system problems, including a discussion on human impact.	Student clearly demonstrated partial knowledge regarding solutions to coral system problems, including a limited discussion on human impact.	Student clearly demonstrated limited knowledge regarding solutions to coral system problems, and may not have discussed human impact.
Choice products are complete and thorough, with few grammatical and spelling errors.	Choice products are complete and thorough, generally free from grammatical and spelling errors.	Choice products are complete and thorough, with some grammatical and spelling errors.	Choice products are complete and thorough, with many grammatical and spelling errors.	Choice products are not complete and thorough, with grammatical and spelling errors getting in the way of understanding.
Total:				