



a nonprofit membership organization dedicated to improving and protecting our coral reef ecosystem
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Virtual Marine Science Classroom

Unit 7: Our Planet (Environmental Issues)

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Course Description: This unit was designed to supplement existing science coursework. Students will learn about the various issues our ocean and people that rely on it, are facing. Students will be taught different issues and given the freedom to brainstorm solutions. *Those solutions will be discussed in Unit 8.*

Course Objective:

1. Students will learn the various environmental issues that are occurring.
2. Students will be challenged to brainstorm solutions to these problems.
3. To encourage identifying an issue and problem solving.

Attendance:

Students are able to complete this at their own pace. There are no deadlines for materials, and it is up to the student and parent/teacher to keep said student on their desired pace.

Internet Etiquette:

Reef Relief staff has enabled commenting on the materials. The comment sections shall be used to ask legitimate questions or voice formatting/technological issues. Should there be any concern about this please contact us.

Materials:

All course materials and worksheets are provided in an online PDF format. If your student does not have access to a printer, feel free to write down your answers on a separate piece of paper.

Technical Difficulties:

Please contact us via email or phone to let us know about any technical difficulties, we will be more than happy to assist!

Course Work:

Reef Relief has provided many different videos and activities for the students. Students are not required to complete all of the materials in this unit, it is ultimately up to the student, parent or teacher.

Skill Level:

Many activities are labeled Beginner, Medium, or Advanced and it is up to the adult to decide what they would like their student to complete. We recommend the following to evaluate:

- Beginner: Someone new to marine science or is between the ages of 5-8.
- Medium: Someone who has received a moderate amount of science education or between the ages of 9-11.

- **Advanced:** Someone who is comfortable with more in depth science topics or between the ages of 12-17.

Grading:

Reef Relief will not be implementing any grading. Parents and teachers may make the personal decision to grade their student's work. There will be a section labeled answer keys that can be used to check your student's work.

Sharing of Material:

Please do not share classroom materials with others. This includes but is not limited to the class password, the class link, worksheets, video, etc.

Office Hours:

Reef Relief is open Monday- Friday from 10:00AM until 4:00PM EST. Outside events may change these hours however we will do our best to respond as promptly as possible.

Feedback:

We appreciate your feedback! Please let us know if you have any questions, comments, or concerns by emailing us or posting in the classroom. There is also a survey within the unit you may submit your feedback in.

Unit 7 Syllabus

Pre-Quiz: We encourage every student to take the pre-quiz at the beginning of the course to evaluate their basic knowledge. The information compiled from this quiz will be used for Reef Relief's general knowledge and grant purposes.

Introduction:

- **Lesson 1: Introduction**
 - This lesson video will explain the goal of this unit and the expectations we have for the students.
- **Worksheet: Environmental Issues Problem Solving (All Levels)**
 - Print or download this worksheet before continuing the unit. As you watch the lesson videos you should list the different problems associated with that topic and also list solutions that you can brainstorm.

Fossil Fuels:

- **Lesson 2: Fossil Fuels**
 - Fossil fuels are a very popular subject, let's learn what they are and what they do.
- **Lesson Notes: Fossil Fuels**
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- **Worksheet: Fossil Fuels and You (Medium to Advanced)**
 - Think of the ways you use fossil fuels in your life and list them.
- **Worksheet: Fossil Fuels Venn Diagram (Medium to Advanced)**
 - Compare and contrast the three different fossil fuels. Based on what you learned.
- **Presenter Notes: Fossil Fuels**
 - A copy of the PowerPoint slides to assist with activities.

Climate Change:

- **Lesson 3: Climate Change**
 - Learn about what climate change is, what is causing it, and how it affects us.
- **Lesson Notes: Climate Change**
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- **Activity: Glaciers (All Levels)**

- In this activity, students will witness on a small scale, what is happening to our glaciers.
- **Worksheet: Calculate your Carbon Footprint (Beginner to Medium)**
 - How big is your carbon footprint? Answer the questions in the worksheet to see what impact your actions have on the climate.
- **Activity: Ocean Acidification Video Activity**
 - Watch this mini video to learn more about ocean acidification. Watch then complete the ocean acidification worksheets.
 - Video Worksheet: Ocean Acidification Coloring (Beginner)- Color this worksheet to learn the process of ocean acidification.
 - Video Worksheet: Ocean Acidification Follow Along (Medium)- Fill out the steps as you watch the Ocean Acidification Activity video, or challenge yourself to complete the worksheet from memory after watching.
- **Worksheet: Ocean Acidification (Advanced)**
 - Learn a little about chemistry and practice seeing what happens when too much carbon dioxide enters the ocean.
- **Presenter Notes: Climate Change**
 - A copy of the PowerPoint slides to assist with activities.

Plastic Pollution:

- **Lesson 4: Plastic Pollution**
 - What is plastic and why is it so harmful?
- **Lesson Notes: Plastic Pollution**
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- **Lesson 4.5: Beginner Plastic Pollution**
 - Lower-level plastic pollution lesson.
- **Lesson Notes: Beginner Plastic Pollution**
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- **Worksheet: How Can I Help Ocean Plastic? (Beginner)**
 - Create drawings to show ocean plastic and how we can help with this problem.
- **Worksheet: Plastic Use (Medium)**
 - How much plastic do you use in a day? How much is around you? What are some ways we can fix this problem?
- **Activity: Microplastics in the Water (Medium to Advanced)**
 - Watch this video and complete the attached worksheet. Presenter notes included for reference.
- **Activity: Albatross Bolus Dissection Video Activity (Advanced)**
 - Watch this video activity and complete the corresponding worksheet to learn about how plastic pollution affects albatrosses.
- **Activity: Biomagnification (Advanced)**
 - Through this activity you will observe what happens when plastic enters the marine food chain. This activity requires materials and will also test your math skills.
- **Activity: DIY Bag (All Levels)**
 - Create a reusable bag out of an old shirt.
- **Additional Resource: Plastic Tracker, The Ocean Cleanup**
 - Use this website to enter your location to see where your plastic could end up. You can do this multiple times for the same location to see different possibilities.
- **Additional Resource: Trash Free Seas**
 - Every year the ocean conservancy publishes reports talking about the common items found during marine debris cleanups. Check out this website to access that information and much more.
- **Additional Resource: Life Cycle of a Plastic Bottle**
 - Watch this video by TED ED to learn more about where plastic comes from and where it goes.
- **Additional Resource: A Plastic Ocean**
 - Watch this movie to learn all about ocean plastic.
- **Presenter Notes: Plastic Pollution**
 - A copy of the PowerPoint slides to assist with activities.
- **Presenter Notes: Beginner Plastic Pollution**
 - A copy of the PowerPoint slides to assist with activities.

Other Pollution:

- Lesson 5: Other Pollution
 - Learn about stormwater, wastewater, chemicals, oil spills, and sunscreen.
- Lesson Notes: Other Pollution
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Point Source vs. Non point Source Color and Match (Beginner)
 - Use the word bank to label the types of pollutions. Color them and sort between point and non-point source.
- Worksheet: Point Source vs. Non Point Source Pollution (Medium)
 - Learn about the different types of point v non-point source pollution.
- Worksheet: Oil Spill Timeline (Medium)
 - Use the oil spill timeline found in the presenter notes for this lesson to complete this worksheet.
- Expert Interview: Chris Robbins, Ocean Conservancy
 - Learn about Chris Robbins' work at Ocean Conservancy to deal with oil spills, microplastics, and policy.
- Movie: Maug's Caldera: A Natural Laboratory
 - In the remote Pacific, the islands of Maug rise out of the sea. Formed by an ancient volcano, shallow hydrothermal vents are found close to coral reefs inside the submerged caldera. These vents emit levels of CO₂ that can be expected in the world's oceans by the end of the century, making these waters a natural laboratory for scientists studying the impacts of ocean acidification on coral reefs.
- Movie: Toxic Waters
 - Florida experiences many types of harmful algal blooms, some of them annually. Several species of algae, like sargassum, aren't toxic, but can cause economic and environmental stress when they pile up on beaches and clog up coastlines. Experts are also uncovering alarming evidence that some of these harmful algal blooms have serious impacts on human health, making their research more critical than ever.
- Movie: After the Spill
 - Oceanographers continue to study the long-term effects this disaster might have on marine ecosystems. Among them are the scientists from the College of Marine Science at the University of South Florida, who have been studying the impacts of this spill from the beginning.
- Movie: A Decade After Deepwater
 - Ten years after the Deepwater Horizon oil rig disaster, scientists are still studying the devastating impacts on the Gulf of Mexico. The resulting spill became one of the largest environmental catastrophes in U.S. history.
- Presenter Notes: Other Pollution
 - A copy of the PowerPoint slides to assist with activities.

Coral Disease:

- Lesson 6: Coral Disease
 - What is a coral disease? We are going to learn what it is, how it happens, and what the different kinds are. We will also learn about the current coral disease outbreak affecting the Florida Keys Barrier Coral Reef.
- Lesson Notes: Coral Disease
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Color the Disease (Beginner)
 - Color in the coral disease onto the coral picture underneath.
- Worksheet: Pathogen (Beginner to Medium)
 - Identify the picture and examples to their known pathogen.
- Worksheet: Coral Disease Study Guide (Medium to Advanced)
 - Fill this out to help you remember and learn the different kinds of coral disease we've experienced.
- Interview with a Scientist: Dr. Karen Neely (2020)
 - Learn about identifying and treating diseased corals.
- Interview with a Scientist: Dr. Karen Neely (2025)
 - Watch this video to learn more about Dr. Karen Neely's background as well as her "update on the reef" discussion since our 2020 interview.
- Movie: Corals in Crisis

- Find out what local Florida Keys scientists are doing to fight the Stony Coral Tissue Loss Disease.
- Presenter Notes: Coral Disease
 - A copy of the PowerPoint slides to assist with activities.

Invasive Species:

- Lesson 7: Invasive Species
 - Learn about how species can become invasive and popular examples of them.
- Lesson Notes: Invasive Species
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Color the Invasive Species (Beginner)
 - Use this coloring worksheet to review invasive species.
- Worksheet: Common Invasive Species (Medium)
 - Fill out this worksheet to help you better understand the species we learned about.
- Worksheet: Invasive Species Research Project (Medium to Advanced)
 - Pick an area outdoors and research the invasive species that may be present there. Also find out what are some efforts being done to combat their infestation.
- Worksheet: Pathways (Medium to Advanced)
 - Identify the pathways described to better understand how invasive species can be introduced to an ecosystem.
- Interview with a Scientist: Dr. Holden Harris
 - Dr. Holden Harris studies lionfish and different trap effectiveness. Watch this interview to learn more about his work and why the lionfish is so problematic.
- Expert Interview: Madalyn Mussey, REEF
 - Join Madalyn to learn about her work at Reef Environmental Education Foundation.
- Movie: Cryptic Critters
 - Learn about a very small worm snail that is invading the popular dive dive in the Florida Keys.
- Movie: Alien Invaders
 - This short movie is about the invasive lionfish.
- Presenter Notes: Invasive Species
 - A copy of the PowerPoint slides to assist with activities.

People and the Changing World:

- Lesson 8: People and the Changing World
 - Learn about how communities are affected differently by climate change and environmental changes.
- Lesson Notes: People and the Changing World
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Natural Disaster vs Natural Events (Medium)
 - Label the images as a natural event or disaster.
- Interview with a Scientist: Nadia Seeteram, PhD Candidate
 - Join Reef Relief staff with Nadia Seeteram, a doctoral student at Florida International University. Learn about climate migration and how climate change is affecting the lives of different groups of people. Start to learn about environmental justice and how you can get involved.
 - Definitions list to accompany the interview.
- Interview with a Scientist: Dr. Tori Johnson
 - Watch this interview to learn about how coastal communities are affected by storm surges and extreme storms. Discover how engineering of human-made structures can be used with mangroves to protect coastal communities from storm damage.
 - Definitions list to accompany the interview.
- Worksheet: Mitigation and Preparedness (Advanced)
 - Help come up with preparedness and mitigation tactics for different natural disasters.
- Additional Resource: Environmental Injustice Articles
 - We Can't Solve the Climate Crisis Unless Black Lives Matter by Dr. Ayana Johnson.
 - Article discussing how the BLM (Black Lives Matter) movement is tied with the climate crisis. The people most affected by climate change, those in BIPOC (Black, Indigenous, and People of Color),

marginalized, and low-income communities, are the ones that should be leading the charge against climate change.

- Environmental Racism by Natalie Colarossi
 - Check out this article for examples of environmental racism.
- We Need Ocean Justice by Dr. Ayana Johnson
 - Article discusses how people's cultures and livelihoods are tied with the health of the oceans.
- Environmental Injustice by Gwen Ranniger
 - Article discussing environmental injustice and the 'Father of Environmental Justice'.
- Additional Resource: Theory of Intersectionality
 - Professor Kimberlé Crenshaw's original publication detailing 'intersectionality'.
- Presenter Notes: People and the Changing World
 - A copy of the PowerPoint slides to assist with activities.

Bonus:

- Activity: Stakeholders and Environmental Problems (Advanced)
 - Stakeholders make important environmental decisions in our communities everyday. Read each short story and write down what types of decisions you would make based on the people involved in the scenario.

Post- Quiz: We encourage every student to take the post-quiz at the end of the course to evaluate their basic knowledge. The information compiled from this quiz will be used for Reef Relief's general knowledge and grant purposes.

Answer Key: We have provided answers to most worksheet activities and have combined them into this folder for parents and teachers to check their student's work.