REEF RELIEF

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 the following unit

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. If needed, Reef Relief can also mail you supplemental materials.

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. Educators will be adding new coursework periodically. When that happens, you will receive an email notification.

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, mature topics and verbiage, 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 10:00 AM until 4:00PM EST. Outside events may change these hours however we will do our best to respond as promptly as possible.

Course Schedule:

The following is Reef Reliefs recommended order to participate.

UNIT 7
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: Problem Solving
    - 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
    - Answer these questions as you follow along with the lesson video.
- Worksheet: Fossil Fuels and You
    - Think of the ways you use fossil fuels in your life and list them.
- Worksheet: Fossil Fuels Venn Diagram
    - Compare and contrast the three different fossil fuels. Based on what you learned.
- Presenter Notes: Fossil Fuels
    - A resource that can be used while following along with the lesson video.

Climate Change:

- Lesson 3: Climate Change
    - Learn about what climate change is, what is causing it, and how it affects
- Lesson Notes: Climate Change
    - Answer these questions as you follow along with the lesson video.
- 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
    - Watch this mini video to learn more about ocean acidification. Watch then complete the ocean acidification worksheets below.
- Worksheet: Ocean Acidification Coloring (Beginner)
    - Color this worksheet to learn the process of ocean acidification
- Worksheet: Ocean Acidification Follow Along (Medium)
    - Watch the Ocean Acidification video and either fill out the steps as you watch, or challenge yourself to complete the worksheet 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 resource that can be used while following along with the lesson video

Plastic Pollution:

- Lesson 4: Plastic Pollution
    - What is plastic and why is it so harmful?
- Lesson Notes: Plastic Pollution
    - Answer these questions as you follow along with the lesson video.

- Lesson 4.5: Beginner Plastic Pollution
    - Lower-level plastic pollution lesson.
- Lesson Notes: Beginner Plastic Pollution
- 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
- Activity: Albatross Bolus Dissection (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 resource to follow along with the lesson video.
- Presenter Notes: Beginner Plastic Pollution
    - A resource to follow along with the lesson video.

Other Pollution:

- Lesson 5: Other Pollution
    - Learn about stormwater, wastewater, chemicals, oil spills, and sunscreen
- Lesson Notes: Other Pollution
    - Answer these questions as you follow along with the lesson video.
- 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: United States 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
    - 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 resource to follow along with the lesson video

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
    - Answer these questions as you follow along with the lesson video.

- 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
    - Use this as a resource to study the content given in this lesson.

Invasive Species:

- Lesson 7: Invasive Species
    - Learn about how species can become invasive and popular examples of them.
- Lesson Notes: Invasive Species
    - Answer these questions as you follow along with the lesson video.
- Worksheet: Color the Invasive Species (Beginner)
- 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: Common Invasive Species (Medium)
    - To help you better understand the species we learned about, fill out this worksheet!
- 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 resource to help follow along with the lesson video.

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:
    - Answer these questions as you follow along with the lesson video.
- Worksheet: Natural Disaster vs Natural Events (Medium)
    - Label the images as a natural event or disaster
- Worksheet: Mitigation and Preparedness (Advanced)
    - Help come up with preparedness and mitigation tactics for different natural disasters
- Interview with a Scientist: PhD Candidate Nadia Seeteram
    - Watch this interview to learn about climate migration and how climate change affects communities
    - People and the Changing World Definitions list
- Interview with a Scientist: Dr. Tori Johnson
    - Watch this interview to learn about the effects of storm surges and how human-made structures and mangroves may be used to mitigate storms
    - Definitions list
- 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 resource to help follow along with the lesson video

Bonus:

- Activity: Stakeholders and Environmental Problems (Advanced)

Post- Quiz: We encourage every student to take the post-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.

Archive: A bank of old versions of lessons and worksheets