



Outreach & Education Resources

Climate Change & Palau: Teacher's Guide

Objectives of Module

1. Build a strong foundation to understanding climate change by focusing on definitions and basic concepts.
2. Encourage students to look at evidence of climate change (Activity 1).
3. Learn about how climate change can affect Palau through the video "Climate Change and Palau: Our Place in the Big World" (Activity 2).
4. Learn the basics of ocean acidification by first learning "What is pH?" (Activity 3).

This module will take up at least two class periods. The 1st class should cover Activity 1: Evidence of Climate Change on Land and Activity 2: Video on Climate Change in Palau. The 2nd class can cover Activity 3: Ocean Acidification and pH.

CLASS 1

I. Introduction: What is climate? What is climate change? Time: 5 minutes

To start off, teachers should cover basic terminology in Palauan, and allow students to offer examples of what they think climate change is. Cover all definitions and terms. It is assumed that students have learned the difference between weather and climate. If not, tell them that the difference is the time scale of each. Weather happens on short time periods, like hours, days, months, seasons. Climate covers years, decades and centuries.

For additional information or tips, please see the pdf titled "Climate_in_our_hands_teacher's_guide." We have included this pdf on the 6th grade teacher's flash drive so that teachers can browse through for additional activities they may be interested in.

Pages 33-35 provides a teacher's guide to Activity 1: "Lesson A1: Evidence of Climate Change on Land."

You can access the full handbook at https://land.oce.global/sites/default/files/2022-03/teacher-s-guidebook-climate-change-and-land_0.pdf

II. Activity 1: Evidence of Climate Change on Land (taken from "The Climate in our Hands – Climate Change and Land, a teacher's handbook for primary and secondary schools", Office for Climate Education (OCE), Paris, 2022), Time: 20-30minutes

To avoid printing, it is recommended that the worksheet be uploaded to students' individual tablets at school. If tablets are not available, they can work as a class and go through each graph by projecting the worksheet onto a screen.

Students will learn about climate change by reviewing evidence of climate change. They will look at evidence from different sources, and provide summary statements for the class. All students should each get a copy of Worksheet A1.1. Each group can be assigned different worksheet sections.

For the 6th grade level, we will skip Worksheet A1.3 and A1.9.

Activity Instructions:

- Break the class into groups of 4.
- Each group will look at one type of evidence for climate change from different fields (Worksheet A1.2–A1.9, except for A1.3 and A1.9).
- Students will write a short sentence(s) that summarizes what they learned. For example, “The Earth has been getting warmer over the last XX years.” They will write this sentence within the corresponding frame of Worksheet A1.1.
- Statements should be specific and clear.
 - Ex. Worksheet A1.2.
 - “Temperature has risen 1.5 deg C since 1880” is a specific statement that includes change and time.
 - “Temperature is rising” may be a correct statement, but it is general and does not indicate by how much and over what time period.

Once students are in groups and given their worksheets, first go over the slides that cover how to read graphs. This will help students understand the information and make their statements. Once you are done covering this section, let them work together as a group to complete the activity. It should take 15-20 minutes to complete. Examples of possible statements for each worksheet are provided in the notes of the presentation.

When groups are done, have them either read their statements to the class or write their statements on the board so that all students can fill in Worksheet A1.1.

As a class, go through each statement while showing the graphs in the presentation.

Wrap-Up for Activity 1. Time: 5 min

Summarize with the students that these are all evidence of a changing climate, and that students have reviewed them for a better understanding of climate change.

III. Activity 2: Learn about climate change impact in Palau through the video “Climate Change & Palau: Our Place in a Big World” Time: 12 minutes

Students will watch the 12 minute video to learn about climate change and how it impacts the world and specifically, Palau. They should use the video to answer “Activity2_ Worksheet” provided.

The video link is provided in the presentation (<https://youtu.be/wpUsY6DJyOM>). You can also search on YouTube for the Coral Reef Research Foundation channel and click on the video.

If they run out of time, they should take the Activity 2 worksheet home as homework. Or you can continue in Class 2 before you do Activity 3.

Answer Key: 1.c; 2.a; 3.b; 4.a; 5.c; 6.d; 7. Up arrows for all; 8-10. Walk more, use reusable bags, use/buy less plastic, turn off lights and electronics when not in use, etc.

CLASS 2

If the Activity 2 worksheet was given as a homework, take five minutes to cover the worksheet before continuing on to Activity 3. Answer key is above.

For Activity 3, it would be helpful to set up the solutions and equipment **before class**. If that is not possible, allocate time during the class period for groups to set up.

IV. Activity 3: Learning about ocean acidification and pH. Time: 50-60 min (1 class period)

Students will learn about ocean acidification by learning the basics of what pH is. They will do an experiment to find out what substances are considered acidic or basic and their corresponding pH levels.

Introduction (5-10 minutes) Teacher will start off with an introduction to Ocean Acidification. Ocean Acidification is a complex concept, so teacher should focus on introducing the concept and not require students to memorize.

The main takeaways from the introduction, or what students should understand is that:

1. Carbon dioxide plays a major role in ocean acidification. As the ocean absorbs more carbon dioxide, it affects the water properties of the ocean.
2. The ocean is becoming acidic, or it's pH level is decreasing.
3. Emphasize that pH is a measurement to figure out if a substance is acidic or basic. Students should learn the pH scale: 0-14. Basic is higher than 7. Acidic is lower than 7. Neutral is 7.

Activity (30 minutes) Instructions for Student Activity:

- Divide the class evenly. It's always best to work in groups of 4. Students should first answer the first 3 questions before tasting and measuring.
- Groups should be given the different liquids in small dixie cups to test with the pH strip. They should first taste each and write them in column A in the order from low acidity (or basic) to high acidity (or acidic). For baking soda, they should just taste a tiny bit. This is a guess based on taste.
- Then they will use the pH paper to measure the acidity. They should leave the paper in the solution for at least 10 seconds, then take it out and compare with the color scale guide on the box.
- They should write the pH value in column B. Based on the pH value in column B, they will write "High" if pH was between 0 and 7 and "Low" if pH was between 7 and 14. If predictions were accurate, Column C would have "low" written in the first rows to "high" in the bottom rows. If the words "low" and "high" are mixed around in Column C, then predictions were not accurate.

Wrap Up/Discussion (5 minutes) When groups are done, direct students attention back to front of classroom, and go through the discussion or wrap up. Go through each groups' results, and have groups answer different questions. There will be some differences in pH readings, and it is subjective as to how students perceive the color strips. Some students may label one as 6, while others may label the same one as 7. This is one of the subjective issues of using pH strips. But generally, you can still tell if something is acidic or basic. Scientists measuring ocean acidity obviously do not use pH strips, instead they use accurate and precise equipment and methods.

How do pH strips work? pH strips will have different pH indicators on the paper; these indicators are usually weak acids or bases that change color at a specific pH. For instance, methyl red is a common indicator that is red at pH of 5 and yellow at a pH of 6.

For more technical details, you can visit this site <https://www.precisionnutrition.com/ie-how-ph-strips-work>.

Connecting the Dots (5 minutes) If there is enough time, it is recommended to spend 5 minutes on this critical thinking exercise. It will help students think about what they have just learned and apply it to what they may know. If there is no time, it is recommended that these questions be assigned as homework.

Contact

If you have questions, comments or suggestions, please call Coral Reef Research Foundation at (680)488-5255 or email sw.patris@gmail.com. You can talk to either Gerda Ucharm or Sharon Patris. We welcome feedback!