SCIENCE CAREER ADVENTURES

Ocean Environmental Manager: Protecting Ecosystems

NGSS Standard: MS-LS2-1

Adventure Description:

In this activity, students will think like ocean environmental managers and design a device that can monitor acid levels and populations of organisms in the ocean.

Activity

Step 1: Background Information on Ocean Environmental Managers and Ocean Resources (5–10 minutes)

- Show Video: Protecting Ecosystems.
- Explain to students that ocean environmental managers are in charge of creating plans to monitor ocean ecosystems. An ocean ecosystem includes all the living and non-living things in the ocean. Examples include: water, beaches, animals, plants, gases (like oxygen) in the water.
- Ask students what could happen if ocean environmental managers didn't monitor the ocean and one part of an ocean ecosystem, like seaweed, was destroyed. Discuss how an ocean ecosystem is interconnected, meaning all parts rely on other parts of the ecosystem. For example, many things in the ocean, like sea turtles, eat seaweed. If a chemical was spilled in the water that killed the seaweed, the sea turtles might not be able to get enough food.
- Next, explain that ocean ecosystems have an ongoing threat: humans! Have students brainstorm ways that humans can negatively impact an ocean ecosystem (e.g., oil spills, trash).
- Explain that humans also negatively impact an ocean system by increasing the acidity of the water. Acidity is the amount of acid in the water.
    - Teacher note: If students ask how acid gets into the water, discuss the following: Many of the machines we use every day (like cars, trains, factories, etc.) produce carbon dioxide. The extra carbon dioxide in the air is absorbed by the ocean water. Once it is absorbed, the carbon dioxide mixes with the ocean water to create carbonic acid. More carbonic acid in the water creates a more acidic environment for ocean ecosystems.
- Next, discuss how an entire ocean ecosystem can be affected when acidity affects a single organism. Show Handout: How Acid Affects Ocean Ecosystems.

Please contact Allison Bischoff, Director of Customer Service, at allison@rozzylearningcompany.com or 314-272-2560 with questions.

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Step 2: Activity Set Up (5 minutes)

- Explain to students that they will be creating a device to monitor acid levels and populations of organisms in the ocean.
- Provide students with Handout: Steps to Monitor Acid Levels and Ocean Ecosystem. As a class, read through the steps.
- Divide students into pairs or small groups. Provide groups with the following materials:
  - Recycled materials, such as cardboard, plastic containers, milk cartons, nuts and bolts.
  - Art supplies (tape, glue, markers, crayons).

Step 3: Building a Device (25–30 minutes)

- Have students follow the steps to create a sketch and build prototype of a device.
- As students are working, ask the following:
  - How is your device going to measure how acidity affects different parts to the ecosystem?
  - How will you camouflage your device so that it doesn't disrupt the ocean organisms?
  - Will the device be able to alert scientists if it is broken and cannot collect data? If so, how?

Step 4: Gathering Feedback (10 minutes)

- Have students switch devices with each other and fill out the feedback section of the handout. Students should look at the labeled sketch and the prototype while evaluating.
- When students are finished evaluating each others designs, have them present their feedback to one another.

Step 5: Discussion (5 minutes)

- Have students showcase their devices and explain how their device will monitor acid levels and their effects on the ecosystem.
- Have a concluding discussion about how acidification of ocean water affects resource availability in the ocean. If water becomes more acidic, it affects the organisms that live in the ocean, like zooplankton. If zooplankton begin to die off, it causes a ripple effect throughout the entire ocean food chain. This is because zooplankton are the base of many ocean food chains.

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Materials List

Provided online:

- Video: Protecting Ecosystems
- Handout: How Acid Affects Ocean Ecosystems
- Handout: Steps to Monitor Acid Levels and Ocean Ecosystem

Not Provided online (each student or group needs):

- Recycled materials, such as cardboard, plastic containers, milk cartons, nuts and bolts
- Art supplies (tape, glue, markers, crayons)

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