Protecting Ecosystems



How Acid Affects Ocean Ecosystems

Changes in the food chain can have ripple affects throughout an entire ecosystem. One small change can

lead to more changes. Here's an example:

- Tiny microorganisms, such as zooplankton, are often the base of many food chains for ocean organisms. Zooplankton have very thin exterior shells.
- Acid enters the water from the increased levels of carbon dioxide in the air.
- The acidic water starts breaking down the zooplankton shells, causing them to die.
- There are fish that rely on zooplankton for food. Because the zooplankton died, there is no food for the fish.
- The fish begin to die of starvation.
- Larger fish that preved on the smaller fish are now out of a food source. As a result, the larger fish also begin to die off.
- The disappearance of a single species can lead to a chain reaction throughout the entire ecosystem. Ocean environmental managers are responsible for taking care of the ecosystem to minimize damages to the ecosystem.



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Steps to Monitor Acid Levels and Ocean Ecosystem

Step 1: Choose an ecosystem to monitor

Ecosystem #1: Arctic Ocean

- The Arctic ocean is located around the North Pole, where water temperatures are always extremely cold. Many types of living things live in these waters.
- How acidic water will affect ecosystem: Acidic water causes the outer structures of phytoplankton to dissolve, which eventually kills them. As a result, the food chain is affected because plankton are at the beginning of many food chains. If plankton die, fish and other ocean organisms will not have food. Acidic water also slows the growth of fish and other organisms in the area.

Ecosystem #2: Area with Coral Reef

- Coral reefs are animals that live in shallow, warm parts of the ocean. A variety of animals use coral reef to live in, find food, and find shelter from predators.
- How acidic water will affect ecosystem: Acidic water corrodes the coral. As a result, fish that use the coral for shelter are left without homes. Acidic water slows the growth of fish and other organisms in the area.

Ecosystem #3: Estuaries

- Estuaries are areas entering into the ocean, where rivers and oceans meet. There is a mix of salt and freshwater in these locations.
- How acidic water will affect ecosystem: Hard shelled animals, like lobsters, crabs and shrimps, actually thrive under acidic conditions and grow stronger shells. The problem is that if they start to over populate, they can take over an area. For example, they may begin to outcompete other animals for food and space. As a result, other animals won't have as much food to eat, which could lead to starvation. Acidic water also slows the growth of fish and other organisms in the area.







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Step 2: Build a Prototype of Device

Sketch a picture of your device below. Make sure to label important parts. Then, build a prototype of your device using art supplies and building materials.

Requirements for your device:

- Is camouflaged into its surroundings so it doesn't scare of fish or other animals.
- Is smaller than the size of a shoebox.
- Has a way to collect water samples and measure the levels of acid.
- Has a way to alert scientists if acid levels are high.
- Can count the number of organisms over time in an area to determine if the population is decreasing.

Step 3: Gather Feedback

Once you have completed your sketch and device, trade devices with another group. Use the feedback form below to give the other group feedback on their design.

•	The design is well camouflaged.	Yes	No	
•	The design meets the size requirements.	Yes	No	
•	The design has a way to collect water samples and measure the levels of acid.		Yes	No
•	The design has a way to alert scientists if acid levels are high.		Yes	No
•	The design can count the number of organisms over time in an area to determine if the population is decreasing.		Yes	No
•	The design is creative and unique.	Yes	No	

- Name one thing that could be done to make this design better:
- Name your favorite part about this design: