When the Bay Changes

Trace how changes in natural cycles affect life and people.

L.7.3.4 "Explain how disruptions in cycles (e.g., water, oxygen, carbon, and nitrogen) affect biodiversity and ecosystem services (e.g., water, food, and medications) which are needed to sustain human life on Earth."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline where the nitrogen and oxygen cycles change, and circle two effects on living things. Number four events that form a chain from farm runoff to a change in the food people catch.

A Cloudy Bay

1. After a heavy rain, water runs off farms beside a coastal marsh. The water carries extra nitrogen from fertilizer into shallow bays. Nitrogen normally moves through soil, plants, animals, and decomposers as living things use and return it. But this sudden flood of nitrogen changes that cycle. Microscopic algae grow quickly because they have more nutrients than usual. The water turns cloudy, and thick patches of algae spread across the bay. A change on land has now reached the water where many species live.

2. At first, the algae make oxygen while they grow. When many algae die, bacteria break them down and use dissolved oxygen in the water. Less oxygen remains for fish, crabs, and other animals to breathe. Some animals swim away, but animals that cannot move far may die. Species that eat those animals lose food, too. With fewer kinds of animals and plants able to survive, the bay's biodiversity drops. Families who catch fish and crabs may bring home less food or lose income from their catch.

3. Cloudy water also blocks sunlight from underwater grasses. If grasses shrink, young fish lose shelter, and bare sediment washes around more easily. A healthy marsh helps trap sediment and remove some excess nutrients before water reaches other parts of the bay. If its plants and animals decline, that water-cleaning service weakens, leaving dirtier water for fishing and other human uses. Living species can also contain chemicals that scientists study for medicines. Losing biodiversity may mean losing possible sources of future treatments, even if no one yet knows which species could help.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does extra nitrogen from farms lead to less oxygen for animals in the bay?

2. How can the drop in oxygen affect both biodiversity and the food families catch?

3. How can cloudy water weaken the bay's water-cleaning service?

4. Why could losing species in the bay matter to people who develop medicines?

3 YOUR TURN

Your own words

Imagine a town restores a strip of marsh beside the bay and uses less fertilizer on nearby lawns. In four sentences, predict how these changes could affect nitrogen and oxygen in the bay, biodiversity, and two services people use.

ANSWER KEY

When the Bay Changes

GRADE 7 · L.7.3.4

PART 1 · READ AND MARK

Underline where the nitrogen and oxygen cycles change, and circle two effects on living things. Number four events that form a chain from farm runoff to a change in the food people catch. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does extra nitrogen from farms lead to less oxygen for animals in the bay?	**Extra nitrogen causes algae to grow quickly. When the algae die, bacteria break them down and use dissolved oxygen, leaving less for animals.**
2	How can the drop in oxygen affect both biodiversity and the food families catch?	**Animals that cannot escape may die, reducing the kinds of animals in the bay. Families may catch fewer fish and crabs.**
3	How can cloudy water weaken the bay's water-cleaning service?	**Cloudy water blocks sunlight from underwater grasses. As grasses shrink, bare sediment washes around more easily, leaving dirtier water.**
4	Why could losing species in the bay matter to people who develop medicines?	**Lost species might contain useful chemicals that scientists have not yet discovered or studied for medicines.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Using less fertilizer would send less extra nitrogen into the bay after rain. With fewer algal blooms, bacteria would use less dissolved oxygen as they break down dead algae. More fish and crabs could survive, supporting biodiversity and providing more food. Restored marsh plants could trap more sediment and nutrients, helping keep the water cleaner for people.

Accept other accurate cause-and-effect chains supported by the passage. For Part 3, look for a prediction about both nutrients and dissolved oxygen, an effect on biodiversity, and two human services.