Where Producers Thrive

Trace how aquatic habitats shape primary production

MAQ.5 "Students will explore the biodiversity and interactions among aquatic life. Survey common primary producers and their roles in primary production in relation to geographical distribution within various aquatic ecosystems..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each producer named in the passage. Circle the habitat condition that helps explain where it lives, such as light, salt, temperature, nutrients, or a surface to grow on.

A Survey from River to Seafloor

1 At the mouth of a river, freshwater mixes with seawater, making an estuary. Along its muddy edges, cordgrass tolerates salty tides; reeds grow nearer freshwater, where salt levels are lower. On warm tropical and subtropical coasts, mangrove trees stand in salty shallows, while many colder estuaries lack them. These plants use sunlight to turn carbon dioxide and water into sugars, storing energy that enters food webs when animals eat their leaves or decaying litter. Their stems and roots also shelter young fish and trap sediment. A survey from the river toward the sea would find different producers as salinity and temperature change.

2 Past the river mouth, sunlight reaches the floor of some shallow coastal waters. Seagrasses, flowering plants, root in soft sediment, while kelp, a large brown alga, grips rocky seafloors in cooler, nutrient-rich water. Both provide food and shelter, but neither can grow on a deep, dark seafloor. In the sunlit water above, tiny diatoms, algae with glasslike shells, drift as plankton. They use dissolved nutrients and sunlight to make sugars and release oxygen. Currents can carry nutrients up from deeper water, supporting dense blooms of diatoms near some coasts. Producers here occupy different surfaces and depths.

3 Farther offshore, the open ocean often has fewer nutrients near the surface than coastal water. Some cyanobacteria, photosynthetic bacteria, can grow where nutrients are scarce; dinoflagellates, a group of protists, may also drift in sunlit water. Both help feed plankton-eating animals through food webs. At deep seafloor vents, sunlight cannot reach producers at all. Instead, certain bacteria and archaea use energy from chemical reactions involving vent substances to build organic matter from carbon dioxide. This process, chemosynthesis, supports animals around vents. Thus a producer survey must consider not just location but light, nutrients, and the source of energy.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why might a survey find reeds near a river but mangroves only along some coastlines?

2. Why might diatoms form a dense bloom near a coast, and where in the water would they grow?

3. How could nutrient levels help explain a difference between coastal diatoms and cyanobacteria farther offshore?

4. How do producers at deep seafloor vents obtain energy differently from producers in sunlit coastal water?

3 YOUR TURN

Your own words

A storm leaves a cool, shallow bay's rocky floor covered with stable soft sediment, and the water stays clear. In three sentences, predict which producer from the passage might decrease and which might increase, then explain how the change could affect energy entering the bay's food web.

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PART 1 · READ AND MARK

Underline each producer named in the passage. Circle the habitat condition that helps explain where it lives, such as light, salt, temperature, nutrients, or a surface to grow on. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why might a survey find reeds near a river but mangroves only along some coastlines?	**Reeds grow near the lower-salt freshwater edge. Mangroves grow in salty shallows on warm tropical and subtropical coasts.**
2	Why might diatoms form a dense bloom near a coast, and where in the water would they grow?	**Currents can bring up nutrients that support a bloom. Diatoms drift in sunlit water.**
3	How could nutrient levels help explain a difference between coastal diatoms and cyanobacteria farther offshore?	**Nutrient-rich water near some coasts supports dense diatom blooms. Some cyanobacteria can grow in the nutrient-poor surface water farther offshore.**
4	How do producers at deep seafloor vents obtain energy differently from producers in sunlit coastal water?	**Certain vent bacteria and archaea use energy from chemical reactions to build organic matter. Sunlit coastal producers use light to make sugars.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Kelp might decrease because the new sediment covers the rock it needs to grip. Seagrass might increase because it can root in soft sediment and receive light in the shallow, clear water. More seagrass could add energy to the bay's food web through photosynthesis.

Accept supported predictions that account for the new sediment and available light. Responses should connect a producer's photosynthesis to energy entering the food web.