

Blue Impact: Coral

Answer Key

Directions

Answer the following questions while watching the New England Aquarium's **Blue Impact Coral Breakup: A Tragic Love Story** video. It is a good idea to read all the questions before you start the video. You may need to pause or replay sections to help you answer the questions.

Questions

1. True or False: Healthy corals are white and colorless.

False

2. What is happening to some corals in the wild?

- a. They are dying.
- b. They are changing.
- c. They are losing their colors.

d. All of the above

3. Corals have a partner which is a(n) algae known as a symbiont.

- a. pink blob; friend
- b. color; symbiont
- c. coral; microbe

d. algae; symbiont

4. List two things that the algae give to the corals?

**Algae give sugars and color to the coral.
(See bonus challenge questions for extensions.)**

5. What do the corals give to the algae

**Corals provide a house and nutrients to the algae.
(See bonus challenge questions for extensions.)**

4. Describe what can happen to the corals if the algae never come back.

Coral and its symbionts can get back together but, when they don't, the coral is left naked and white, or bleached. It's called catastrophic bleaching and can lead to coral death.

7. What is the consequence of coral bleaching and coral death?

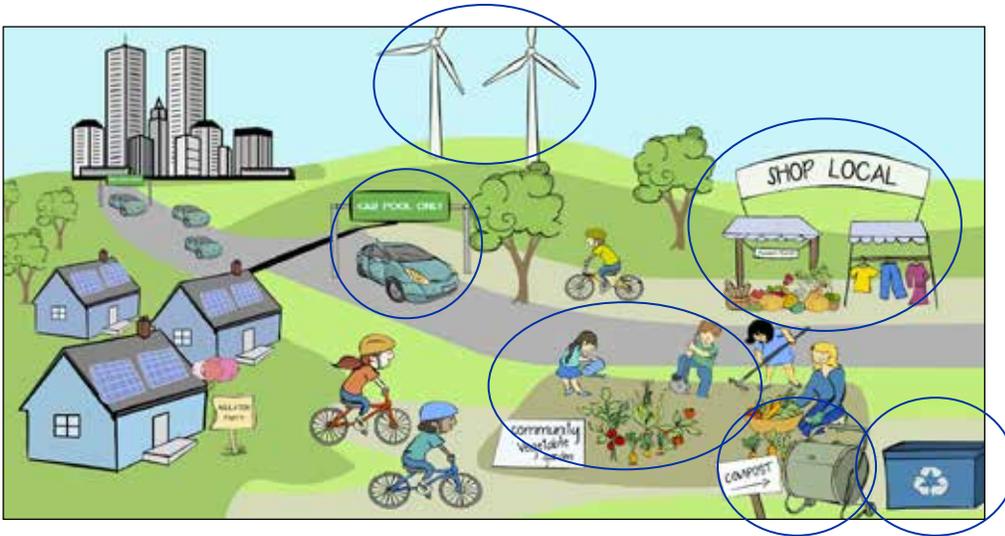
a. The fish that use the reef as their habitat may die or move to another reef since the coral can no longer provide habitat like it used to before the bleaching. This could lead to a lack of biodiversity.

b. Communities that use the reef for their livelihood or for ecotourism will suffer.



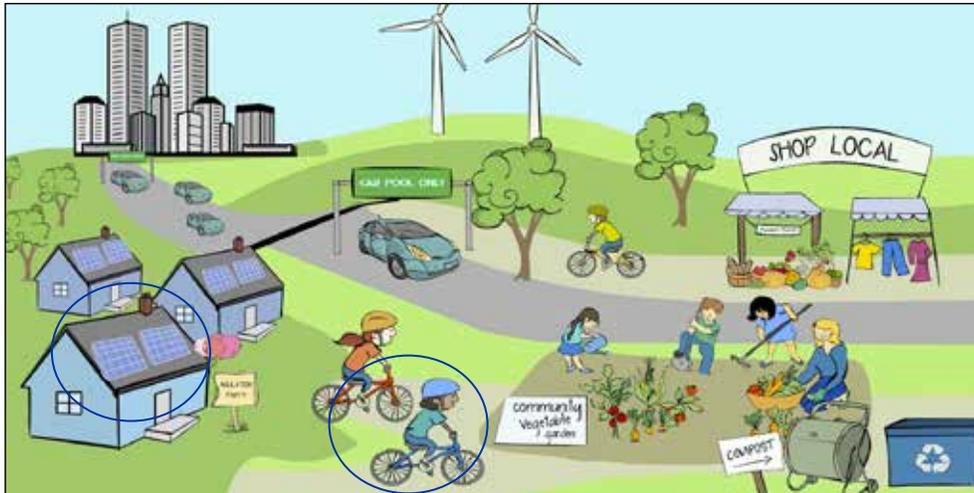
For question #8, Pause video at 4:09 or use image below.

8. Describe two actions that are helping to reduce the atmospheric CO₂ level in this image.



Describe what you see	What actions are they taking?	How does this help decrease the CO ₂ blanket?
<i>Wind turbines instead of power plants</i>	<i>Making electricity from wind</i>	<i>Turbines do not need fossil fuels (stored carbon) to create electricity. They use natural wind power to create electricity. It does not add CO₂ to atmosphere like coal-power plants.</i>
<i>Hybrid car in car pool lane</i>	<i>Investing in hybrid car and carpooling</i>	<i>Hybrid vehicles make less CO₂ emissions. More people per car means fewer cars and fewer emissions.</i>
<i>Shop local sign</i>	<i>Buying clothes and produce from local areas</i>	<i>Products that are made locally do not need to be transported as far by automobile, boat or plane. This reduces the amount of fuel consumed and reduces CO₂ in atmosphere.</i>
<i>Community vegetable garden</i>	<i>People working together to plant vegetables close to their homes</i>	<i>Products that are grown locally do not need to be transported as far by automobile, boat or plane. This reduces the amount of fuel needed and reduces CO₂ put into the atmosphere.</i>
<i>Compost bin</i>	<i>Composting food and other biodegradable materials instead of throwing the in the trash</i>	<i>Food scraps that are sent to a landfill decompose with the help of bacteria. The bacteria in landfills, which exist in the absence of oxygen (anaerobic environment), produce methane (CH₄). This is a greenhouse gas. Keeping a small compost bin at your house or school helps to keep food out of landfills and cuts down on the greenhouse gases.</i>
<i>Recycling bin</i>	<i>Recycling materials instead of throwing them in the trash</i>	<i>It takes energy to create new products. If products are reused and recycled then the overall amount of energy used is reduced. Using less energy means using less fossil fuels, which reduces the amount of excess greenhouse gasses. Also when we keep items out of landfills, we are helping to reduce the amount of methane (CH₄) produced in landfills.</i>

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Describe what you see	What actions are they taking?	How does this help decrease the CO ₂ blanket?
<i>Person riding bike</i>	<i>Riding a bike instead of driving/ riding in a car</i>	<i>Riding a bike requires zero fossil fuels. This is a great way to get exercise and help the planet.</i>
<i>Solar panels on the house</i>	<i>Installed solar panels on the roof</i>	<i>Using the sun to create electricity is a renewable form of energy. Instead of getting energy from industrial power plants, which most often burn fossil fuels like coal or natural gas, you can power the electronics in your house with the help of the sun and solar panels. This reduces the use of fossil fuels used and reduces the amount of greenhouse gases put into the atmosphere.</i>

CHALLENGE QUESTION: SHORT ESSAYS

Answer the following questions on a separate piece of paper.

1. Explain, in detail, how a hotter atmosphere is contributing to coral breakups.

An increase in CO₂ in the atmosphere leads to more CO₂ in the ocean. More CO₂ in the atmosphere also leads to increased atmospheric temperature, which in turn warms up the ocean. Higher temperatures slow down the nutrient transfer process between coral and the algae. An increase of CO₂ level in the water makes it harder for the coral to maintain its structure. The video shows the algae leaving but most of the time the algae will die without its coral symbiont. Since the algae gave the coral its color, the coral becomes naked and white, or bleached. If the coral is left without the algae for too long, the coral will die and leave behind the hard calcium carbonate structure that forms coral reefs.

According to the Environmental Protection Agency, coral reefs are a fragile ecosystem. Scientists who monitor ocean temperature have noted a link between temperature and coral bleaching episodes. Coral bleaching is caused by environmental stresses and results in corals ejecting zooxanthellae from their polyps. Sometimes, small, localized bleaching events result from chemical spills, sedimentation and decreases in ocean salinity from heavy rains or flooding. Large global instances of bleaching, called mass bleaching, appear to be caused primarily by an increase in water temperature and calm sunny conditions. Even small temperature increases, as little as a 1-degree Celsius above normal temperature range over a period of a week or more, can cause corals to expel their zooxanthellae. If conditions quickly return to normal, the coral may recover. Unfortunately in the face of numerous other threats, corals are often vulnerable and can die after extended periods of bleaching.

(For more details see the digital appendix online. www.neaq.org/teacherguides)

2. What can we do to prevent further coral bleaching?

By reducing our community carbon footprint we can reduce the amount of CO₂ in the atmosphere. See chart in question #8 for answer choices and additional resources in the digital appendix.