



Steve Palumbi and Megan Morikawa Study Coral Reef Damage in American Samoa

hhmi | BioInteractive

Scientists at Work
Student Worksheet

OVERVIEW

This worksheet complements the short video "[Steve Palumbi and Megan Morikawa Study Coral Reef Damage in American Samoa](#)" from the *Scientists at Work* series.

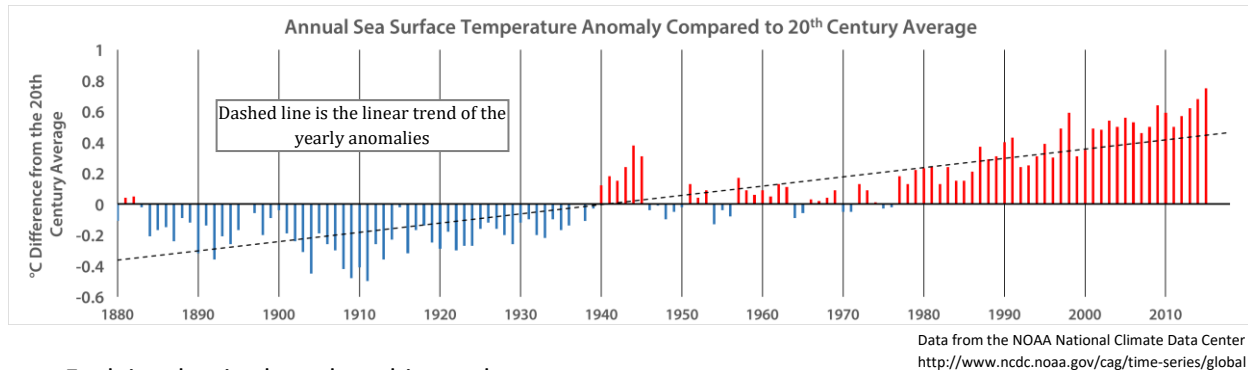
PROCEDURE

1. Prior to watching the video, read the questions below.
2. Watch the video.
3. If working with a partner or in a small group, discuss and answer the questions below. If working alone, think about and answer the questions below.

QUESTIONS

1. Provide two examples of why coral reefs are important ecosystems on Earth.
2. Corals form symbiotic relationships with microscopic photosynthetic algae that live in their cells and give the corals their distinct colors. The relationship is an example of mutualism, in which both species benefit. Predict how each organism in this relationship could benefit the other.
3. Heat stresses coral communities and can lead to coral bleaching. What is the impact of long-term coral bleaching to an individual coral? To a coral reef?
4. Some corals in the warm pools off Ofu Island can withstand temperatures of 32° to 34 °C without bleaching. So, the researchers set up a controlled laboratory experiment to try to determine why these corals survive in such excessive heat. With regard to the experimental design, provide two reasons why Dr. Palumbi devised a standardized test for the corals.
5. In the first experiment, Dr. Palumbi applied heat stress to corals from different pools, warm and cool. Make a claim regarding the resistance to bleaching of the warm pool corals and the cool pool corals. Justify your claim with experimental evidence.

6. Below is a temperature anomaly graph that depicts changes in ocean temperature since 1880. Use the graph to answer the questions that follow:



- Explain what is plotted on this graph.
 - What does the horizontal line plotted at 0°C represent?
 - When was the last time sea surface temperatures were below the 20th century average?
 - What is the approximate slope of the dashed line? (Show your work and include units.)
 - On average, a 1 °C change in temperature is enough to put corals at risk of bleaching and death. Based on the slope of the trendline, in how many years will global temperatures be 1 °C above average? Show your work and justify your answer.
7. The next question Dr. Palumbi's group asked was whether corals from cool pools could become more heat resistant if given time to acclimate to warmer temperatures. Using a flow chart, describe the second experiment.
8. Make a claim regarding the ability of transplanted corals to become more heat resistant. Justify your claim with evidence.

9. Based on Dr. Palumbi's discussion of the heat-resistance genes, differentiate between acclimation and adaptation using the coral in the film as an example.

10. If you were doing the research in the film, what is another scientific question you would like to try to answer?

11. Corals build a reef's calcium carbonate structure, which in turn creates habitat for numerous other organisms to live. Explain how human activities are affecting ocean temperatures and how these changes lead to reef destruction and the loss of biodiversity.

12. Considering biodiversity and economics, describe three consequences the loss of coral reefs would have on the global human population.