



Teacher Guide

The Incredible Shrinking Lake

Key idea: We can learn about how people affect Earth by studying satellite photos.

Time: 20 minutes

Objective

Students explore how human activities can change the distribution of water on Earth. Students analyze two satellite photos of Lake Chad taken decades apart and answer questions about what has happened to the lake and what might have caused the change.

Conduct the activity

Give students *The Incredible Shrinking Lake* Student Handout, which has satellite photos of Lake Chad taken in 1972 and 2007. Divide students into groups and have them study the photos and discuss the questions on the handout. Before you share the background information on this sheet, students should observe what has changed about the lake and make inferences about what might have caused the change. Call on several groups to share their ideas with the class. Then use the background information to guide a class discussion on the effects of the changes in Lake Chad on the water cycle in the region.

Background information

Lake Chad in Northern Africa is a freshwater lake that was once the size of Lake Erie. Because of a long drought in that part of the world, people and animals have to depend on the lake for water far more than they did before. The amount of water taken from the lake has quadrupled in recent years. Today, Lake Chad is just a shadow of its former self—one-tenth the size it was in the 1960s. Soon it may have to be renamed Pond Chad.

STANDARDS ALIGNMENT

NGSS MS-ESS3.A.1: Natural Resources: Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

MS-ESS3.C.2: Human Impacts on Earth Systems: Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

Geography

IV.14: Human Systems: How human actions modify the physical environment.

V.16: Environment and Society: The changes that occur in the meaning, use, distribution, and importance of resources.



Use the information in red as background for your class discussion of the changes in Lake Chad.

1. What are the features in the pictures? *[The dark blue in the photos is water. The green areas show plants growing on the lakebed where the water has receded. The light brown area is arid terrain surrounding the lake.]*
2. What is similar in these pictures? What is different? *[The general outline of the lake is the same in both pictures. In the 1972 photo, most of the area is covered by water, while in the 2007 photo, the area covered by water is a small fraction of what it was. Most of the lakebed is now covered by vegetation.]*
3. What caused the difference? *[The lake is shrinking because of a combination of a long drought in the area and more people taking water from the lake. People have been taking more water for irrigation and also damming rivers that feed the lake.]*
4. What impact will the change in lake size have on the area? *[Lake Chad is a source of water for millions of people living in the surrounding countries—Chad, Cameroon, Niger, and Nigeria. With less water in the lake, these people will have to find other sources of water for drinking, farming, and industry. Plants and animals that live in or near the lake may have trouble surviving as the lake shrinks.]*
5. What will happen if the change continues? *[If the lake disappears completely, the effects on people, plants, animals, and the water cycle will be even more severe. People may be forced to move away from the area. Animals or plants may die. The climate may become even drier if vegetation in the area disappears. What was a lake could become part of the Sahara Desert.]*
6. If you didn't have photos from space, how could you measure the changes in Lake Chad? *[Photos of Lake Chad taken from space let us see and measure the changes in the lake in a way we could not do on the ground. However, scientists on the ground could take many measurements of the lake's depth over a period of years and also observe changes in its shoreline to figure out how the lake is changing.]*