



Project Underground

Classroom activities with an emphasis on caves and related karstlands — their biological, geological, hydrological, and historical diversities and values.

A Natural Resource Education Guide





Sinkholes in a Cup

OBJECTIVES

Students will learn to:

- demonstrate how sinkholes and caves form.

METHOD

Students will demonstrate how sinkholes form using a cup, sugar, sand, and water.

BACKGROUND

Sinkholes are natural depressions in the landscape caused by solution and subsidence of earth materials. They form by the removal of underlying material (subsurface rock and soil) through the karst hydrologic system. They can form by slow, gradual subsidence or by sudden collapse of an underlying void.

Sinkholes are common throughout about one quarter of the U.S. You can usually identify them as circular or oval depressions in cultivated fields that may pond standing water after rains. They may be forested, cleared, or rocky and steep-sided, and they can have open bottoms which swallow entire springs or streams. Sinkholes can be small and localized or larger than football fields. Both circumstances have one thing in common; they indicate caves and/or broken, weathered limestone bedrock near the soil surface. Sinkholes are evidence of a subterranean hydrologic process, either in the past or present. Formation of a new sinkhole or continued collapse of an existing sinkhole indicate present day subterranean hydrologic activity.

MATERIALS

For each group of students:

- one 8 oz. styrofoam cup
- green rust free scouring pad or very thin sponge
- empty two liter soda bottle
- one sheet of paper

- sugar
- sand

PROCEDURE

1. Make a hole in the bottom a styrofoam cup about the size of your thumb (Step A in the figure).
2. Cut a circle the size of the cup bottom from a thin scouring pad. Place this circle in the bottom of the cup (Step A in the figure).
3. Cut the paper to approximately the same height as the cup. Roll it into a tube which is about one-half the diameter of the cup and place the tube into the bottom center of the cup (Step B in the figure).
4. Fill the inside of the tube with sugar and the outside of the tube with sand. (The sand is between paper tube and sides of the cup.) Remove the paper tube. Place a thin layer of sand over the sugar (Steps C and D in the figure).
5. Cut the bottom off a two liter soda bottle at about the same height as the paper cup. Fill it about one-half full of water. This symbolizes groundwater. The level of the water in the tub and the sand in the cup should be about the same (Step E in the figure).



GRADES: 3-12

SUBJECTS: Science, Geology

SKILLS: observing, interpreting, communicating

DURATION: 30 minutes

GROUP SIZE: any

VOCABULARY: sinkhole, limestone, groundwater

6. Place the cup with the sugar and sand in the water. Watch as the water fills into the cup and the sugar dissolves and runs out. A sinkhole is formed in the cup as the surface sand sinks into the area where the sugar dissolved. You may need to remove the cup from the water for the water to drain and the sinkhole to form (Step E in the figure).

EVALUATION

- What natural process does the water in the soda bottle represent?
- What type of rock does the sugar represent?
- What characteristics must a rock have to be suitable for forming sinkholes and caves?

