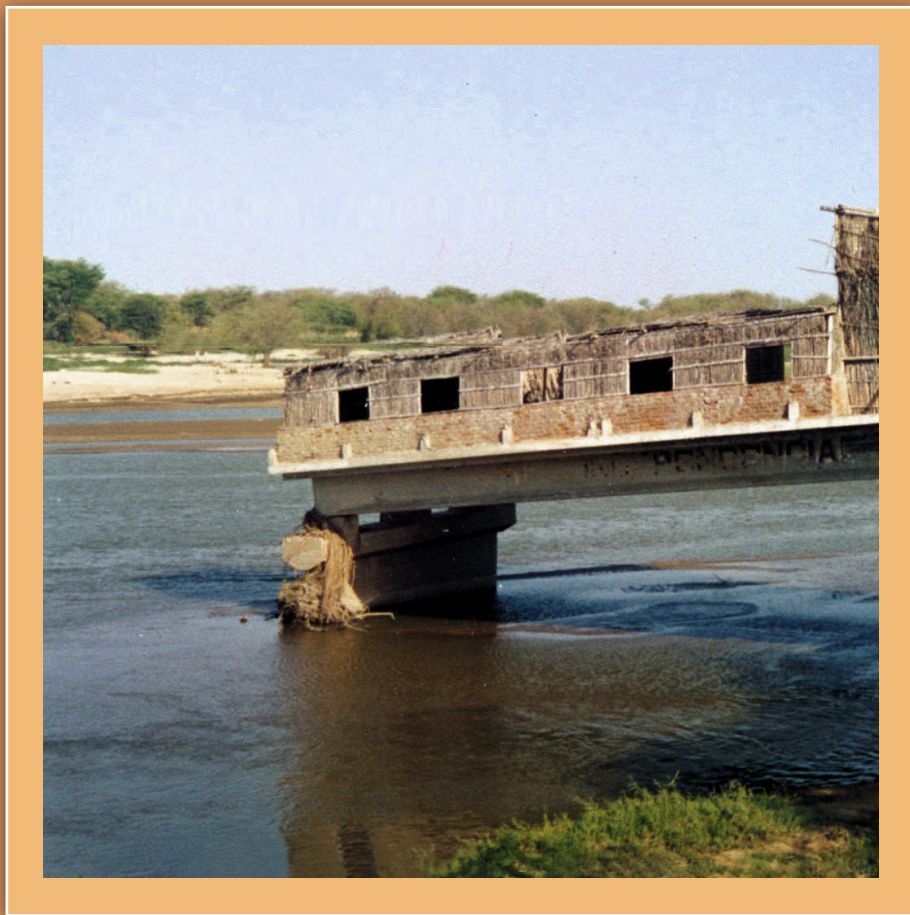


STEM *Sims*™

# Scouring



# Scouring

**Do you need an idea for a scientific study?  
Try out one of our ideas or make one of your own.**

**Start learning right now about how people prevent erosion from damaging bridge's superstructure. Take the following brief quiz to see how much you already know about scouring. See the bottom of page 4 to check your answers.**

1. The term "scouring" is best defined as:
  - a. a new method of building a bridge.
  - b. diminishing the time required to weld the structure of a bridge.
  - c. the removal of sediments around a pier.
  - d. the addition of rock around a foundation.
2. All of the following are common types of scouring *except*:
  - a. adjacent scour.
  - b. abutment scour.
  - c. local scour.
  - d. contraction scour.
3. All of the following are common countermeasures to prevent scour *except*:
  - a. bend way weirs.
  - b. concrete armor units.
  - c. spurs.
  - d. the removal of sandbags.
4. Which material would be *most* likely to undergo scouring?
  - a. large rock
  - b. concrete block
  - c. fine sand
  - d. concrete structures
5. Which of the following is the *most* common cause of highway bridge collapse in the United States?
  - a. heavy traffic loads
  - b. corrosion of metal components
  - c. erosion of materials around bridge abutments
  - d. nesting of animals in and around bridge piers



Photo courtesy of USDA NRCS.

## Riprap /rip,rap/

Noun: Loose stone used to form a foundation for a breakwater or other structure.

Verb: Strengthen with such a structure.

Just as riprap must be built up in steps to support a bridge structure, you must do a similar process to complete the puzzle below. Each space to the right represents one letter. As you move down the puzzle, each lower word has one letter added to the previous term; however, the order of the letters has been rearranged. Steps six and eight have been completed for you. Please see the bottom of page 4 to check your answers.

Medical person \_\_\_\_\_

\_\_\_\_\_ Sea \_\_\_\_\_

Older Bambi \_\_\_\_\_

Inhibit \_\_\_\_\_

Not purchased, instead \_\_\_\_\_

Some teachers are \_\_\_\_\_ t e n u r e d

Fake teeth \_\_\_\_\_

Walked slowly s a u n t e r e d

Wild experiences \_\_\_\_\_





# Scouring

## The Schoharie Creek Bridge Collapse

In April of 1987, the Schoharie Creek Bridge collapsed due to extreme scouring. The New York State Thruway bridge spanned 500 feet over the Schoharie Creek before it collapsed. Almost 6 inches of rain combined with large snowmelts created 50-year flood conditions on the creek. This increased flow undermined the weak foundation and one of the bridge's piers failed. This redirected the creek's flow and increased the water's speed around the remaining piers, which led to their collapse and the bridge roadway failure. Ten people died as a result of the bridge collapse.



Investigators found that the original bridge design was deficient in the weight of the material, called riprap, that surrounded the piers. Heavier rocks should have been required that would have been more resistant to erosion than the rocks that were actually positioned around the piers. In fact, the rocks the bridge designers used were underweight by more than a factor of five. This bridge collapse led to more rigorous design standards for bridge foundations and produced more stable and safer bridges.



New techniques and improved ground-penetrating technologies allow bridge inspectors to see deep beneath the surface features surrounding bridge piers and abutments. This helps the inspectors determine if the lower materials have remained in place or have been eroded. The foundation materials of the Schoharie Creek Bridge had been eroded away for many years prior to the bridge collapse. Investigators of the bridge collapse hypothesized that about 30 feet of material underneath the original collapsed pier had been eroded, which caused the piling to drop down into the hole once the surrounding surface materials were washed away with the flood waters. The ability to see underground using the latest technology is a powerful tool to help prevent future bridge failures.

Please visit our site for helpful information:  
[STEMsims.com](http://STEMsims.com)

Page 2 Answers: (1) c, (2) a, (3) d, (4) c, (5) c. Page 3 Riprap Answers: Dr, red, deer, deter, rented, tenured, dentures, sauntered, adventures.

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