Building a Better Levee:
Stream Table Experiment

Based on a lesson from American Field Guide Teacher Resources: Floods, www.pbs.org/americanfieldguide/teachers

Complete this lesson at home. Then, visit the exhibition *Living with Hurricanes: Katrina and Beyond* at the Presbytère to learn more about levees and how they failed during Hurricane Katrina.

OVERVIEW

In this lab, students will experiment to see how levees and related structures can fail and will try to determine ways to make these types of structures stronger.

BACKGROUND

When a river overflows, velocity decreases suddenly, causing the river to drop some of the larger grains of sediment that were suspended in the water. This causes a natural shoulder on the river called a levee. Humans have long been living and working on the flood plains of rivers. To protect themselves from flood waters, they have built bigger and sturdier levees along the river banks. These structures have to be carefully built as they can fail in a variety of ways.

CONCEPTS

1. Flowing water creates characteristic features that can be used to interpret water flow.
2. Most river and stream beds have inclinations below 5 degrees.
3. Small, light sediments are carried more easily by flowing water than large, heavy ones.
4. Gently-flowing water sorts sediments in predictable, consistent ways.

MATERIALS

- large plastic tray with sides (will serve as a stream table)
- sand
- flowing water (use a hose or pour from a large pitcher)

EXPERIMENT

1. Using the stream table or tray, create a levee out of sand. This levee should be approximately as high as the walls of the stream table (not higher or you might risk overflow) and several inches wide at the base.
2. Start the water flow and start a stopwatch. You do not want the water flow to be so high that it blasts the back of your levee. Again, keep an eye on the lake to be sure it does not overflow.

3. Watch the levee. Do you see water coming out the other side? As soon as you see water coming out of the downstream side of the levee, note the time. Also, note where the water came from (e.g., the bottom, the sides, or over the top in a crevasse).
4. Continue to watch the levee. How long does it take to start to collapse? Describe what happens to your levee over time.
5. Now consider what you might do to strengthen your levee. Try to design a new levee that will not fail in the same way that your previous levee did. You should also try to make it hold out longer than the previous levee did. Build your newly designed levee and then repeat steps 2-4.
6. Clean up your station and answer the following questions.

QUESTIONS

- After you started running the water, how long did it take the water to start seeping through the levee/dam?
- Did it take longer to collapse your levee/dam once you reinforced it? Why or why not?
- Describe the different ways that your levees/dams failed in the different trials.
- What types of materials would you suggest that engineers build their levees/dams from?
- If you were to design a levee or dam, how would you ensure that it would not fall in a flood?