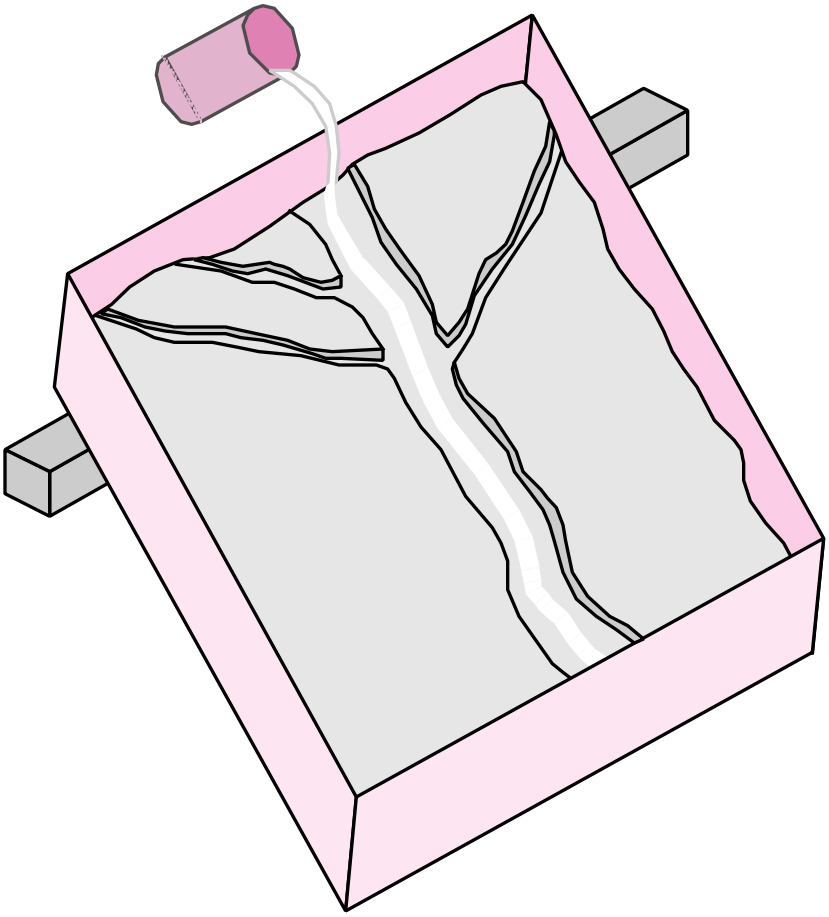
Overflowing the Banks

Flood!
NOVAactivity

The Mississippi River flows through downtown St. Louis, Missouri. To prevent flood damage in the densely populated urban center, city planners built extremely high floodways along the riverbanks. During the Great Flood of 1993, these floodways held the river within its banks, but caused the height of the river to rise in the city and back up into less well-protected tributaries (small streams) that feed into the river. To see how this happened, construct a model using clay to form the riverbanks. Write your observations on a separate sheet of paper.

Materials for each group

- a large flat container or tray with sides, such as a wallpaper tray or aluminum baking pan
- a sufficient amount of modeling clay to cover the bottom of the pan
- water
- some sponges
- drawing paper
- pencils



Procedure

1 With your group, sketch a rough map of a river that will run from one end of your pan to the other, at least 3 cm (approximately 1 inch) wide. Add several tributaries (small streams) that will feed into your river as it heads downstream.

2 Using the clay, build a model of your map inside the tray, making sure that the banks of your river are approximately 1 cm (approximately 1/3 of an inch) deep.

3 With the tray lying flat on a desktop or table, pour water into the streams and river so that the water level is not quite at the top of the 1 cm (approximately 1/3 of an inch) riverbanks. Start with 500 ml (1 pt) of water.

4 Tip the model slightly so that the water runs downstream. Notice how the tributaries feed into the river, increasing the depth of the water as it flows. Now pour more water into the model from the top, to simulate increased rainflow into the system. Observe what happens. Empty the water.

5 Now add clay levees to your terrain. About two-thirds of the way down your river's course, build high walls (approximately 3 cm, or 1 inch, high) on both sides of the river, and narrow the river to a width of less than 2 cm (approximately 2/3 of an inch).

6 Before pouring water into your model, make predictions about how the water flow will be different because of the new riverbank material. What do you think will happen when the water reaches flood level?

7 Repeat steps 3 and 4. When the water reaches flood stage, observe what happens in the area around the high walls. What happens to the area just above the high river walls? How does the excess water flow into the surrounding area? How do your observations compare to the events in St. Louis during the flood?

8 Drain the water from your model. Place a small piece of sponge behind each of your two levee walls and flood your river again. What happens to the water? How does it differ from what happened in your model without sponges?