

every drop counts

Sedimentation Activity

At home activity for children

Objectives?

Participants will (1) describe how sand, silt, or both affect water flow; and (2) identify human activities that add sand, silt, or both to surface water.

Method

Participants create a model to stimulate changes to a stream and its water flow when silt, sand, or both are added to the system

Materials

A clear plastic 1-gallon container such as a storage box, enough pea-sized gravel to cover the bottom of the container, enough water to fill the container 1-inch from the top, 1 cup of coarse sand, 1 cup of silt (silica powder from the edge of a stream), and three straws for each participant.

Background

Sedimentation is excess amounts of silt and other particles entering streams and rivers from the surrounding watershed. Sediments enter water in two main forms: (1) surface erosion sends small amounts of particles into the water and (2) mass erosion (ex. Landslides) dumps huge amounts of dirt into water. Causes of surface erosion vary. They can include anglers walking trails to favorite fishing spots or cattle trampling and consuming streamside vegetation that holds soil in place. Logging, mining, and road construction can also contribute to surface erosion. Mass erosion, such as mud slides or earth slumps, occurs more frequently on hillsides altered by human activity, such as clear-cut logging, road construction, or home building.

Regardless of its source, sedimentation may affect aquatic wildlife by reducing nutrients, diminishing sunlight to plants, and altering stream energy and velocity. One important effect of sedimentation is to block the flow of water to organisms residing in bottom substrates. The flow of clean water is important in most aquatic environments because flowing water often carries dissolved oxygen that aquatic animals need for respiration. Depletion of oxygen in bodies of water affects organisms even at early stages of development. For instance, some fish lay their eggs in gravel that receives a

flow of clean water, either from a stream or river or from spring water percolating up from the lake bottom. As the water flows over the eggs, it dissolved oxygen to them. If the eggs do not receive enough oxygen, they die.

Silt and sand enter streams through erosion. Silt and sand act like concrete to block water movement and thus diminish the amount of oxygen reaching the developing eggs. Once the erosion-causing activity is stopped, streams may cleanse themselves (depending on the extent of the problem, self-cleansing can take from 1 to 50 years).

The major purpose of this activity is to show that aquatic wildlife and its habitat can be influenced by land-based activities in the surrounding watershed. Students experience what happens in a stream and its flow of water when sand, silt or both are added to the water.

Procedure

1. Set up a demonstration- a container with gravel covered by water- so the participants can see how to proceed.
2. Ask participants to gather the supplies and setup its demonstration. Ask the students why oxygen is important to aquatic animals. Explain the three parts of the procedure (steps 3, 4, and 5 below), and ask students to predict what will happen as each sediment type is added to the water.
3. Each participant should simultaneously blow bubbles into the water with a straw. Make sure the straw is at or near the bottom of the container so that the end is pushed into the layer of gravel. The participants then discuss the ease or difficulty in blowing the bubbles and records their observations. Remind participants that the blowing of bubbles is meant to demonstrate how things move through water in different situations.
4. Instruct the groups to add 1 cup of sand to the water and then to blow bubbles again. Be sure that the straw is pushed through the sand, so it reaches the gravel. The group then discusses the ease or difficulty in blowing the bubbles and records its observations on the sheet on the wall. Remind participants that the blowing of bubbles is meant to demonstrate how things move through water in different situations.
5. Now add 1 cup of silt to the water, allow to settle, push the straw end into the layer of gravel, and blow bubbles again. Participants can then discuss the difficulty level and record their observations.
6. Conduct a class discussion about the demonstration and results and describe what these results might mean to aquatic organisms and their need for clean water. How do sand and silt get into the water in nature? Which of these sources are human and which are natural? What can happen to fish and other aquatic organisms if too much sediment gets into aquatic systems?

Extension

1. Add brightly colored beads to the container to represent fish eggs.

2. Research and discuss ways to minimize the addition of sand or silt into natural aquatic systems.

Evaluation

1. Write on a chart or blackboard all the observations and ideas generated by participants; engage them in a discussion about the meaning of these results.
2. Ask participants to create two illustrations (1) a healthy stream that could support a variety of aquatic life and (2) a human activity that causes siltation in that stream.

***Write up by Marisa Sedlak. This activity was adapted from the Project WILD Aquatic K-12 Curriculum and Activity Guide.*