

## ACTIVITY 3: WATERSHED IN A BOX

### Learning Objectives:

- Students will understand why we care about monitoring water quality in streams.
- Students will begin to make a connection between our actions on the land and the effects on water quality.
- Students will learn what a watershed is.
- Students will distinguish between point source and nonpoint source pollution.
- Students will create a model to represent nonpoint source pollution and demonstrate how this pollution affects surface water.
- Students will design a community that will try to minimize the effects of pollution on surface water.

### Standards:

Agricultural Education B.8.3, E.8.2; Environmental Education B.8.5, B.8.15, B.8.19, B.12.3, B.12.17, D.8.1; Science Connections A.8.6 ; Science Inquiry C.8.1, C.8.3, C.8.5, C.8.6, C.8.11; Life and Environmental Science F.8.8, F.8.10

### Materials for each model:

- A box cover or other shallow box that is 12" x 12" or larger
- Foam pieces, Styrofoam® or paper
- Heavy-duty aluminum foil or white plastic bag
- Permanent markers
- Spray bottle
- Cup of water
- Powdered, unsweetened drink mix – two or three different colors
- Bucket

### Time:

25 minutes

### **Background:**

No matter where you live, the water quality in rivers and streams is determined by what happens on the land around them. The area of land that drains to a stream or river is called a watershed.

One watershed is separated from another watershed by a low rise, the crest of a hill or a mountain chain. Rain or snow that falls on opposite sides of the higher land results in water flowing into different watersheds. Not all watersheds are the same. Some watersheds are hilly, while other watersheds are flat plains. Regardless, precipitation that falls within the watershed that does not infiltrate into the ground, flows over land to reach a lower point – a lake, river or stream.

As water flows over land, it picks up soil, chemicals and other pollutants and carries them to lakes, rivers or streams. This water transportation system is called runoff.

In rural or agricultural areas, runoff water carries a wide variety of materials, including pesticides, soil and animal wastes, directly into waterways.

In urban areas, hard surfaces such as driveways, sidewalks, rooftops and roadways prevent water from soaking into the ground. As a result, the runoff water, which can be contaminated with road salt, heavy metals or automobile fluids, flushes quickly into storm drains that dump directly into streams and rivers.

Pollutants that do not have a single source are called nonpoint source pollution. This pollution originates from many different places.

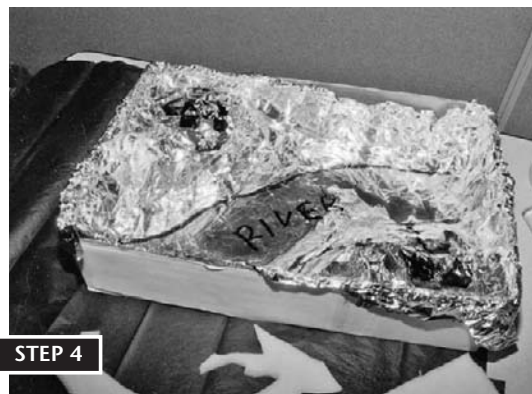
Everyone lives in a watershed. We may not realize that what happens somewhere in the watershed will eventually have an impact on a lower point in the watershed – a lake, a river, or a stream.

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### **PROCEDURE:**

1. Use a box cover or a shallow box to contain the runoff model.
2. Arrange pieces of foam or crumpled paper to represent hills and land forms in the bottom of the box. Encourage your group to be creative. Remember, the highest points should be near the box walls. Leave a gully or valley in the middle of the box to represent a stream or river.
3. Cover the land forms with a large piece of aluminum foil, shiny side up. Start in the middle of the box and gently press the foil into all of the hills and valleys, working your way towards the box walls. Push the edges of the foil up along the walls of the box and fold the foil over the edge of the box. Be careful not to tear the foil.

4. With a permanent marker, draw on the foil to outline the streams or rivers in your model. Next, draw houses, roads, farm fields, feed lots, stores or anything else that you want in your community.
5. Sprinkle different colors of powdered drink mix onto the model. The colors represent different kinds of pollution. For example:
  - Use red powder to represent yard care chemicals and sprinkle it around the houses.
  - Use green powder to represent salt on the roads or automobile waste and sprinkle it along roadways or in a parking lot.
  - Use brown powder to represent exposed soil at a farm field or a construction site.
  - Use blue powder to represent human or animal waste and leave little piles of powder near homes and farms.
6. Ask the group what they think would happen if it rained.
7. Using the spray bottle to represent a rain storm, spray water on the hillsides. Watch the water flow toward the rivers and streams.
8. Ask the group to tell you what happened. Then ask the group how they would redesign the community to prevent water pollution.
9. Dump the water from the model into a bucket. Remove the foil from the model and set it aside. Place a new piece of foil on the watershed. Ask the group to redesign the community to prevent water pollution. Sprinkle powdered drink mix in the appropriate areas. Let it rain. Was there an improvement?
10. Ask the group what parameters they might monitor in a stream to help assess effects of our uses of the land on water quality. Discuss with students the types of water pollution issues that local communities are facing as a result of land use.



STEP 4



STEP 5



STEP 7