

## Make a Watershed Model

Adapted from The GLOBE Program, 2005

This exercise will introduce students to a watershed and allow them to explore the topographic changes that alter the water pathways.

### Objectives-

- ✓ Introduce what a watershed is and how it works
- ✓ Understand the water pathways and how watersheds can change by manipulating the model
- ✓ Help give examples how their model relates to the real world topographic features

### Estimated Time-

- ✓ 1- 1 ½ hours



### Materials-

- ✓ Sand, wood, rocks, etc (for outdoor model)
- ✓ Buckets, bowls, paper towels, etc (for indoor model)
- ✓ Spray bottle
- ✓ Sponges
- ✓ Red food coloring
- ✓ Permanent marker (able to write on plastic)
- ✓ Ruler
- ✓ Topographic map of Saratoga Lake Watershed
- ✓ Plastic sheet (2mx2m)

### Creating the Model-

- 1) Find an area about 1 meter square to build a watershed model. This could be a tabletop or plywood sheet if you are working inside or a grassy or sandy area outside.
- 2) You and your students gather the various objects to make the model, such as a plastic sheet, rocks buckets, sponges, spray bottles with water, and food coloring.
- 3) Have the students arrange objects of various sizes inside the area. The tallest objects will become 'mountains'. Shorter objects or buckets or bowls may become hills, likes or plains.

- 4) Cover the entire area and all of the objects with a plastic sheet. Have the students use their hands to mold the plastic loosely around the covered objects. This is a model of a landscape with hills, valleys, and connections between them.
- 5) Have the students predict what will happen if it ‘rains’ on their model. Where will the water go? Will it go faster in some places? Will some places form pools? How do you know?
- 6) Use the spray bottle to ‘rain’ on the top of your highest ‘mountain’. Continue raining until you can see where streams, rivers and lakes form.
- 7) Have students choose a small pool on their model to be a Hydrology site. Mark the site with a marker, stone or other object.
- 8) Ask the students to make it rain by using the spray bottle. Ask the students, “Where does the water come from that flows to your Hydrology site? Where does water flow away from your site? What things on the landscape determine what will be part of your basin? What determines the watershed? Explain to the students that the places where water hits and flows into their site are in the catchment basin for their site, the watershed is the basin boundary.
- 9) Ask students: “Where would be a good place on their model to have their school? Where would you like your house to be? Have the students mark these places on the model.
- 10) Have students explore the consequences of changes in their catchment basin. Here are some things you can do:
  - a. What happens if you dam the stream that flows to your water site? (Use a sponge to create a dam).
  - b. What happens if you plant a forest above your site? (Use a large flat sponge for the forest – it will soak up water for a time just like soil and vegetation) What happens if you remove the forest?
  - c. What happens if someone builds an industry that causes pollution? (Use a small piece of sponge soaked in food color where your industry will be and watch the ‘pollution plume’ as it rains.)
  - d. What happens if someone decides to use water from your stream for irrigation or urban use? (Make ‘canals’ that take the water away from your stream to other places)

### Modeling Topography-

- 1) Have students use a permanent marker or small pieces of tape to mark points on the model that are 10cm above the surface of the table or ground.
- 2) Use a marker to connect all of these points to make a ring around the model that is 10 cm above the surface
- 3) Measure points above the surface at 20 cm. Use a marker to connect them in a ring around the model.
- 4) Continue measuring points at 30, 40, 50, etc., connecting them until they reach the highest peak.
- 5) Look at these rings from above. Ask students what they notice. Are the concentric (the higher ones inside the lower ones)? Are they all the same distance apart?
- 6) Draw the ring on a flat piece of paper as if they were seeing them from above.
- 7) Examine a topographic map. Ask students if their rings look like topographic lines?
- 8) Have students identify their previous Hydrology site on a topographic map. Find the elevation of their site from the map.
- 9) Use the topographic lines and benchmarks on the map to identify areas that are uphill from their site
- 10) Look for 'ridges' or 'divides'. These are at mountaintops or places where the elevations start to decrease. Ask students to think about whether water falling on that place would flow toward or away from their Hydrology site.

### Concluding Discussion Questions-

- 1) What would happen if you poured a pile of salt on the 'mountain' above their site?
- 2) What would happen if you poured the pile on the other side of the 'mountain'?
- 3) Ask students to use a marker to outline the watershed for their Hydrology site.
- 4) Have students explain 3 things that might happen in their own basin that would affect water quality.