**Cooperative Watershed Mapping**

**Student Instructions**

A **watershed** is an area of land where rainwater and melting snow all flow to a single river mouth. The watershed essentially collects all the precipitation that falls on the area, funnelling it to a single point. Watersheds are separated from each other by geographic features such as ridges, hills, or mountains. The patterns formed by waterways influence not only the shape of the land through erosion, but the vegetation and wildlife that can live there, and how people colonize the area. All living things need water to drink, but people also use waterways for food (fishing), transportation, leisure, waste disposal, and inspiration.

In groups of 4 – 5, you will cooperatively be making a watershed outdoors with found materials to mimic landforms like mountains and hills. The watershed is covered with a large garbage bag. Discuss where the river water will flow. Identify the lowest point where all the rivers will discharge the water into a lake or ocean. Now use the trickle flow apparatus to draw the rivers. The trickle flow apparatus works like an hourglass. The material trickling out represents precipitation and will mark waterways that form a watershed. Finally draw a map of your watershed to scale on graph paper and cleanup.

**Roles**

Reader: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Equipment Handler(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Watershed map artist(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Everyone will take a turn at being a trickle flow apparatus Guide in the following order:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Everyone is responsible for being an Encourager and Clean Up Technician.

**Materials**

Trickle flow apparatus with cornmeal

2 metre sticks Scissors 4 tent pegs

Graph paper Clipboard Pencil and eraser

Green garbage bag

**Instructions**

1. Examine the criteria for Teamwork Skills to remind yourself how to work well together.
2. Collect all your materials, except the trickle flow apparatus, before proceeding to the school yard.
3. Use the scissors to cut open the garbage bag and lay it on the ground.
4. Have a general idea of where you want the major tributaries of your watershed to be located. Use sticks, rocks, or other objects you find in the schoolyard to show where hills, ridges or other barriers to water flow are located. You can vary how many tributaries there are and where you want to put them. Place the objects **under** the garbage bag to make landforms.
5. If it is a windy day anchor the edges of the garbage bag with the tent pegs.
6. Examine the watershed to decide the lowest point where your watershed will empty into a large water body like a lake or ocean.
7. When the teacher approves your watershed, your team will get a trickle flow apparatus.
8. Before removing the tape from the hole in the bottom of your trickle flow apparatus, practice moving it cooperatively according to the Guide’s instructions. Keep the bottom of the trickle flow apparatus close to the ground so that the marks that you draw will be clear. The Guide should use the compass directions that we have learned in class. (Hint: Make sure you know which direction is north.)
9. The first Guide will be in charge now. Other members of the group each need to hold one of the strings on the trickle flow apparatus. Starting at the first headwater area, gently remove the tape blocking the hole on the bottom of the trickle flow apparatus. Carefully steer according to the Guide’s directions. One member of the team may have to gently jiggle their string to keep the cornmeal flowing, and they may stop the flow by stopping the jiggling. When you have reached the mouth of the river, place the tape back over the hole of the trickle flow apparatus and gently move the apparatus to the next headwater area, appoint a new Guide, and aim for the mouth again (see Fig. 1). Once you join the first tributary, try to stay as close as possible to the original riverbed until you reach the mouth. Continue this process until you are finished your map (or until your cornmeal runs out).

2.

1.

3.

4.

5.

Figure 1. Sequence of Steps for Watershed Mapping: Start each watercourse at the headwaters of each of the smallest streams and continue all the way to the mouth.

1. When you are satisfied with your cornmeal watershed, draw a map to scale on the graph paper. You may want to use the metre sticks as gridlines to help you transcribe this accurately on your paper.
2. Everyone helps clean up. Put natural materials back where you found them. Reusable materials should be returned, and the corn meal should be cleaned up according to your teacher’s instructions.
3. Finish your map by adding the required components of a map (compass rose, scale, legend, colour, contours, elevation, etc.). As a team, agree to names for the features on your map (rivers, streams, mountains, etc.).

**Analysis Questions**

1. Teamwork Skills
Carefully examine the criteria on the **BLM 2 Teamwork Skills Rubric** and reflect on how well you and your partners worked as a team. Evaluate yourself and the member of your group whose birthday comes next **after** yours. (Learning Skills)
2. Using the names on your map, answer the following.
	1. Where would the highest part of your map be? (1 I)
	2. Where would the lowest part of your map be? (1 I)
	3. Use contour lines to illustrate the elevations at different parts of your map. Remember, these lines must show changes in elevation that allow water to always flow from the headwaters to the mouth. (3 I, 3 C)
3. Identify 3 factors that affect the flow of water across a landscape. Be sure to explain how each factor affects the flow. (3 I)
4. Identify 3 factors that may have affected the flow of cornmeal from the trickle flow apparatus. Be sure to explain how each factor affects the flow. (3 I)