

Crumpled Paper Watershed¹

TEACHER GUIDE

Materials

- Plain white paper (enough for every student to have a sheet)
- Water-soluble markers (enough for student groups to have a few different colors). These markers usually say water-washable. Markers that are not water-washable will not work!
- Spray bottle with water
- Paper towels for cleanup

Directions

1. Tell students that for this activity they are going to create a landform that they can use to learn about how pollution gets into the Bay.
2. Pass out a sheet of blank paper to every student and provide water-soluble markers to groups of students so they have a few different colors. Tell students that this piece of paper will represent the land around where they live like a map
3. Have students draw an overhead view on their paper of things like houses, the school, and other things in their community (don't include any water features (rivers, lakes, etc.). Give them enough time to draw a few different things, but not fill the whole paper
4. Go back to students' answers from their warmup, and remind them of different sources of pollution such as farms and animals. You can suggest one or two things from the previous activity's infographic such as a power plants and factories. Have students choose a different color marker and add these sources (as drawings) to their paper.
5. Remind students that the land is not completely flat. To add contour (high and lows) to their map, they should crumple the paper up into a ball, and then un-crumple it without flattening it. Their uncrumpled map should have a lot of high points and low points.
6. Tell students that it is about to rain. On their notes sheet, have them predict what will happen when it rains on their land. When they are ready, have students put their papers on paper towels or trays to help with clean-up. Take out a spray bottle (or pass spray bottles out to students), and gently spray down onto each students' map. You should spray enough that water flows down to the low points and forms tiny ponds, but not so much that the entire paper becomes soggy.
7. Have students make observations and answer the questions on their Watershed Notes Sheet. Some things they should notice:
 - Water flows down and forms small ponds in the lower places (and/or makes a pool off the side of the map)
 - The colors from the "pollution sources" flow with the water into the ponds, polluting them
 - The paper (ground) also gets wet as the water soaks into it

¹ Based on Crumpled Paper Watershed, Alice Ferguson Foundation: http://fergusonfoundation.org/teacher_resources/crumpled_paper.pdf

8. Lead a class discussion about the results of the demonstration:
 - **Based on this model, how do you think pollution that is sitting on the ground gets into waterways?** Pollution washes off the ground and goes downhill into the closest body of water like a river or a stream
 - **How do you think pollution that is on the ground gets into the Chesapeake Bay?** (It may be useful to show the Chesapeake Bay map here to remind students of how the rivers flow into one another). When pollution goes into a river, that river connects to the Bay or to another river that connects to the Bay.

After the discussion, have students write the answers to these questions in the Analysis section on the back of their Watershed Notes sheet.

9. Ask students if all the water that they sprayed on their paper ended up in the same place. (The answer is likely no for most students). Have them pick one of the “bodies of water” where their water ended up and give it a name like “Lake Sarah” or “The Sparkling Ocean”. Once they’ve done this, ask them what part of their paper sent or drained water into “Lake Sarah”. Can they point to it? Could they draw a line around it? (Circulate and help students point out the areas where their water came from – it should only be parts of the paper that are close by and not separated by a high point)
10. Ask students where the pollution in Lake Sarah came from (it is the same area they just pointed out). Tell students that scientists give a special name to this area of land to help them study pollution for a body of water like their little lake. They call this area of land “the watershed” (put this term up on the wall) and have students write a definition of watershed on their notes sheet: “A watershed is an area of land that drains into a specific body of water.”
11. Tell students that the watershed is named after the body of water it flows into like “The Potomac River watershed”. Ask students what the watershed they pointed out would be called (“Lake Sarah watershed” or “The Sparkling Ocean watershed”). Tell students that they can remember what a watershed is because a watershed “sheds its water” into a river, lake, ocean, or other body of water.
12. Clean up students’ papers before moving on to the next part of the activity. If students want to keep their papers, pour out the extra water and find a place in the classroom where they can dry and keep their shape.