

Understanding watersheds

Focus questions	How might we model a watershed? What are the impacts of various human activities on a watershed?
Vocabulary	Watershed, watershed boundary

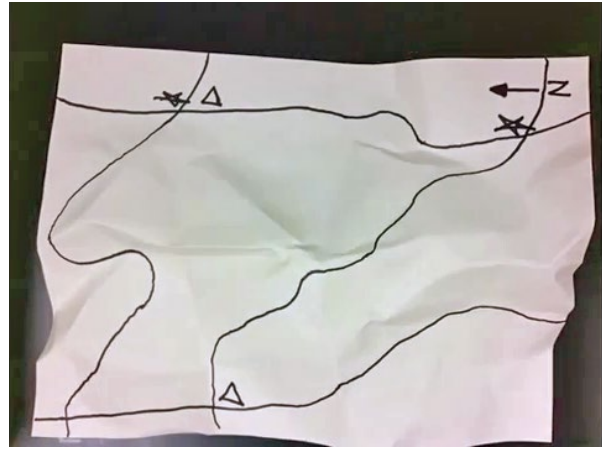
Background

We can't speak about water ecology without including discussions on erosion, watersheds, climate change, and human activities, such as construction and development, impermeable surfaces, and agriculture. In this set of lessons, we will be examining a large watershed, the mighty Mississippi River, and human impacts to the localized regional waterways and to the Gulf of Mexico. Students will learn about watersheds, areas of land that funnel drainage water into a water system such as a river, stream, lake, or ocean, and the watershed boundaries that divide them. Water flow is governed by gravity, not directionality, therefore all water runs downhill. Runoff commonly refers to the drainage of water from a land surface, be that a yard, a parking lot, roads, a farm field, feedlot, or other surface. When water runs off of a land surface, many materials may be picked up and moved with the water. This action is called erosion. Erosion might be due to water, or wind or glaciers. Water erosion can be of many types depending on the quantity of water running off and the elevation.

The water cycle incorporates surface water, groundwater, and water in the atmosphere. Surface water is what we see in lakes, rivers, streams, and the ocean. Groundwater is stored in aquifers that provide underground water for drinking and it may feed surface water sources. Precipitation recharges aquifers. The hydrologic cycle is constantly recycling water through the processes of precipitation, evaporation, and condensation.

Materials

- 1 piece of printer paper
- Black permanent marker
- Water-based markers (blue, red, green, yellow, orange)
- Spray bottle
- Cookie sheet or tray to collect any overspray



Procedure

1. Fold paper in half lengthwise (like a hot dog bun).
2. Add "N" for north and an arrow pointing upwards on a bottom corner of the paper so that you can track your original orientation.
3. Crumple the paper into a ball (no tearing).
4. Straighten out the paper with the centerfold line on the top.
5. Using the permanent marker, draw at least two lines for roads: one going primarily north-south and one going east-west across the fold;
6. With the permanent marker, mark locations for a factory (a triangle), a farm (an oval area) and a housing development (two pentagons) on one side of the fold,
and a city (several rectangles), a housing development and a factory on the other side of the fold.
7. Using a yellow water-based marker, circle the housing developments two times.
8. Using a green water-based marker, circle the farm location two times.
9. Using the red water based marker, circle the city location two times.
10. Using the orange water-based marker, trace over the road lines you created.
11. Using the blue water-based marker, mark over at least half of the ridges in the paper
12. Take a photo of your model.
13. Set the model in a cookie sheet or on a tray or paper towel. Spray the paper with water until water pools on the paper.
14. Take a photo of your model after spraying.

Reflection

Describe your model to another person at your table.

1. Where does the water pool?
2. Where does the water flow?
3. What does the water look like on either side of the centerfold? Which watershed has more effects from runoff (darker-colored water)?
4. What do the blue marker lines indicate?
5. How many watersheds was your model divided into? Are there differences or similarities between each side? Each watershed?

Rubric for self-assessment

Skill	Yes	No	Unsure
I can describe relevant components of a watershed and the relationships between components			
I can identify the limitations within the model.			
I can describe patterns observed from the model.			
I can use the model to predict outcomes/impacts.			