

Clay Watershed Model

Summary

Subject(s)

ESS: Earth's Systems & Processes

Grade/Level

Grades 2-4

Activity Type

Develop a model to represent patterns in the natural world.

MN Science Standard

2E.4.2.1.1

SEP / CCC

SEP: Obtaining, evaluating & communicating information

CCC: Patterns

Est. Lesson Time

45 Minutes

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Implementation

Introduction

This activity allows students to make their own watershed model and observe how water flows across the land, where it pools, and how the surrounding environment can affect what/where pollutants make their way into the water. The boundaries of a watershed are the high points in the area (hills, bluffs, mountain ridges, continental divides). A watershed's geographic boundaries can be many sizes, large ones typically made up of smaller sub-watersheds (e.g. local lake and stream drains into 9-Mile Creek, then into the Minnesota River, which drains into the Mississippi River). Human development in the watershed can introduce pollutants that make their way into the water through stormwater runoff. Observe how gravity drives water to drain to the "lowlands", and how this movement allows water to collect substances (lawn clippings, oil, soil) along the way creating "stormwater runoff".

Key Terms

- **Watershed** - An area of land with high and low points that causes water to drain into different rivers, basins, or seas.
- **Sub-watershed** - An area of land within a watershed that drains a smaller region of the water into a specific creek, river, or lake.
- **Stormwater Runoff** - A mix of rainwater or snowmelt and the substances it collects as it moves through a natural or human-made environment before it drains into a water basin (lake, creek, river)
- **Water Quality** - A measure of how healthy the water is for the plants and animals that rely on it. High water quality means the water is free from pollutants (sediment, fertilizers, chemicals) and is close to natural conditions. Low water quality, also known as Impaired Water, means the water has too much of one or more pollutants, making it less habitable for the plants and animals. Water is usually impaired because of human activity in the watershed.

Objective

Obtain and use information from multiple sources to identify where water is found on Earth.

Essential Questions

- What is a watershed?
- Do you live in a watershed?
- How many rivers, lakes or streams do you have in your local watershed?
- How and why does water take different paths across the Earth's surface?
- What kinds of wildlife rely on streams, rivers and ponds to survive?
- How does human activity impact the watershed and its wildlife?
- What are ways in which a watershed can affect water quality positively or negatively?
- How does the environment in a watershed affect the pollutants that enter and move through that watershed?

Materials & Resources

- Local Map
- Map with Watershed Boundaries
- Soft Clay (modeling/playdough)
- Large sponge with access to a bucket of Water
- Glitter/Sand/Food Coloring
- Tray to catch excess water

Introduction

Present the map of the local area to the students. Ask them to identify landmarks and/or discuss what they notice about land use/waterways. Consider sources/effects of pollution, areas of water filtration, human impact, elevation change, natural environment. Draw connections between land use and water quality.

Examples: Waterways, Water Bodies, Water Treatment Plant, Neighborhoods, Parks, Sports Stadium, Farms, Livestock Operations, Highways, Development Near Water, Natural Environment, High Ground, Valleys, Municipal Landfill, Racetrack, Marina

Refer back to this map after the activity to discuss how water/pollutants may move through your local area based on the topography.

Procedure

Creating Your Model Watershed (20 Minutes)

- A. Each student will be making a small geographic feature out of clay. They will all be combined side-by-side to form a landscape.
- B. There is only one completely necessary feature that must be sculpted and that is a main river channel. Many students can collaborate to fit their piece of the river channel together.
- C. Students can create any number of various features. Here are some examples:
 - River Channel - a section with a wide trench touching two sides
 - Hill - a section with a distinct high point
 - Stream - a section with a small trench running through it.
 - Valley - a low point between two higher points
 - Cliff - a section with a distinct vertical face
 - Prairie - a section with low gradual slopes
 - Wetland/Lake - a section with a basin enclosed on all sides
 - Building/Town - a section with flat paths between building like structures
- D. Begin to shape the piece of clay. Coordinate with others to make sure there are a variety of the geographic features.
- E. Beginning with the main river channel, start combining the clay sections side by side to create a landscape with varying low and high areas.
- F. Add glitter, sand, or food coloring to areas that may be a source of pollution [Human-impacted sections with towns, farms, factories]. At least 3 areas with pollution are recommended.
- G. Hypothesize where the water will travel and where it will collect.
- H. Place your watershed on the tray. Fill the sponge with water, then squeeze it over top of the watershed to simulate rain clouds. There should be enough water that it starts to form streams. Spray water until there has been enough time to observe its movement.
- I. Observe the path water travels along as it is carried into rivers and lakes. Observe how the pollutants move through the environment.

Small Group Discussion (5 Minutes): Pair off with another student and discuss the following questions:

- A. Where are the boundaries of the watershed? Does the model have one large watershed? Are there smaller sub-watersheds within the large watershed?
- B. Did the rivers/lakes contain pollutants? Were there pollutants from more than one source?
- C. Did any waterway/lake carry pollutants from one watershed into another?

Large Group Discussion (15 Minutes): As a whole class, have some pairs share their answers with the group. Then discuss the following questions/topics:

- D. What watershed is the school in? What watershed do you live in? Are they a part of the same large watershed? Are they a part of the same sub-watershed?
- E. What lake/river/stream does runoff from your neighborhood drain into?
- F. Why do pollution problems tend to get worse downstream?
- G. How can knowing what watershed you live in help you determine possible pollution problems and/or help you reduce the pollution that enters your watershed?
- H. Present a map of the nearby watersheds, preferably with sub-watershed boundaries highlighted. Identify possible major pollution sources (landfill, industrial area, farmland,

Wrap-up (5 Minutes): The Key Ideas from the lesson are:

- A watershed is a geographic area where all the water that is in it drains to a specific lake, stream, or river.
- A watershed may contain smaller areas that drain into each other before draining into the main waterway. These are called sub-watersheds.
- The environment around the watershed can contribute pollutants or waste to the waters in the watershed through stormwater runoff.
- Everyone lives in a watershed, and you have an impact on the pollutants that are collected in the stormwater runoff.