Pollution Postcards

This activity incorporates writing and drawing while teaching students about the common pollutants that can get into our water sources.

For grades K - 8

Created by the Athens-Clarke County Stormwater Management Program

Lesson Summary

Students learn about ecosystems, stormwater runoff, and the many different types of pollutants that can get into our water sources. After a brief lesson and discussion, students create pollution postcards with a picture on the back and an informative message on the front. These postcards are meant to be sent to a loved one or friend to teach them about a specific type of pollution. This lesson encourages creativity, turns the students into teachers, and forces students to connect water quality issues with simple behavior changes.

Objectives

- Students will learn the basic components of a freshwater ecosystem.
- Students will learn that stormwater runoff is the number one source of water pollution.
- Students will learn about common water pollutants, including animal waste, litter, excess fertilizers and pesticides, oil, and sediment.
- Students will learn several simple ways for humans to reduce their impact on water quality, i.e. pick up after pets and routinely check cars for oil leaks.
- Students will be able to illustrate and write out an informative message about water pollution.
- Students will educate their peers and their parents about what they can do to stop water pollution.

GSE Science Major Concepts

3rd Grade:

S3L2. Obtain, evaluate, and communicate information about the effects of pollution (air, land, and water) and humans on the environment.

4th Grade:

S4E3. Obtain, evaluate, and communicate information to demonstrate the water cycle.

S4L1. Obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem.

5th Grade:

S5P1. Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change.

6th Grade:

S6E3. Obtain, evaluate, and communicate information to recognize the significant role of water in Earth processes.

S6E6. Obtain, evaluate, and communicate information about the uses and conservation of various natural resources and how they impact the Earth.

7th Grade:

S7L4. Obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments.

Materials

- postcard templates (printed on cardstock if planning on mailing them)
- crayons
- markers
- pens or pencils
- mailing address for a loved one or friend

Background Information

This activity focuses on ecosystems, stormwater runoff, and common household pollutants.

Ecosystems

According to Encyclopedia.com, an ecosystem is a "complete community of living organisms and the nonliving materials of their surroundings." Ecosystems include everything from animals, plants, and bacteria, to rocks, soil, bodies of water, and even the atmosphere around them. The size and make-up of ecosystems vary tremendously.

A freshwater ecosystem, specifically, is a type of aquatic ecosystem. These include lakes, ponds, rivers, streams, and springs. Freshwater ecosystems, as opposed to marine or saltwater ecosystems, are often classfied by temperature, light penetration, and vegetation, and they are home to many different insects, amphibians, fish, and birds.

Stormwater runoff and household pollutants

Stormwater runoff is rainwater or snowmelt that flows over the ground. In natural areas, most rainwater soaks into the ground, because the ground there is pervious, allowing water to pass through it. In developed areas, the ground is hard and impervious, which prevents stormwater from infiltrating, resulting in runoff.

As runoff moves across the landscape, it can pick up many different pollutants. In Athens-Clarke County, when runoff enters a storm drain, it carries those pollutants directly from the streets and sidewalks to the streams and rivers (freshwater ecosystems). Some common pollutants include:

- **Sediment.** Sediment can cloud the water and harm aquatic plant and animal life. Sediment also presents points of nucleation for bacteria, promoting the growth of harmful bacteria.
- **Bacteria and pathogens.** Present in animal waste, bacteria and pathogens can enter the stream through septic tank leaks, pet waste and wild animal waste. Once there, the bacteria can make the water unsafe for recreation and drinking.
- **Nutrients.** Found in fertilizers and animal waste, plant nutrients such as nitrogen and phosphorous can cause problems. Once in the stream, nutrients promote algae growth, resulting in algal blooms and the disruption of aquatic ecosystems.
- **Litter.** Trash and dumped items can suffocate, choke or otherwise harm aquatic animal life.
- **Household chemicals.** Soaps, pesticides, paints and other commonly used household chemicals can enter streams and rivers and poison aquatic life.

For grade 7, discuss how different pollutants can disrupt ecosystems by affecting different parts of the aquatic food web, such as the plants, macroinvertebrates, and fish.

Procedure

Start by discussing ecosystems. For younger students, this may just be naming things that make up the environment around us. For older students, make sure to mention the inclusion of both biotic (living) and abiotic (nonliving) factors. To move the discussion toward freshwater ecosystems, name a specific body of water and ask students - "What do you normally see around you when you visit the river?" This can lead to a larger discussion of food chains, food webs, and biodiversity.

Next, start a discussion about stormwater. Ask the students what happens to rain when it hits the earth, and if possible, write the answers on the board. The students should generate a list that includes soaking into the ground, going into a river, or hitting infrastructure or homes. Discuss what happens to the water when it soaks in [becomes groundwater, gets used by plants, can evaporate in evapotranspiration]. Then ask what happens to the water when it runs off the ground [picks up pollutants, can heat up, goes into a storm drain and enters the water quickly]. Ask students to compare/constrast stormwater in natural areas and urban ones [what happens when it rains on top of a forest vs. what happens when it rains on top of a parking lot].

Ask students to name pollutants that runoff can pick up and explain how those pollutants harm the ecosystem and affect humans. Fill in the gaps of their list with pollutants from the background information. For older grades, ask students to explain what can happen when multiple pollutants enter our waters [algal blooms and warm water can both lower dissolved oxygen, harming fish, for example].

Pass out the paper postcard template and crayons to all students. Tell them that they are drawing a pollution postcard that will be sent to a friend or family member. On the front of the postcard, they are to draw a picture of one of the types of pollution discussed earlier. Older students should draw an infographic or a specific message about water pollution. On the back, they are to write out a message to a friend explaining what happens when people pollute or describing what they drew on the front. Remind them to consider their audience when crafting the message. Use the following questions to brainstorm:

"What would you say to someone who you saw throw a piece of trash out of their car window?"
"What would you say to someone who let their dog poop in your lawn and didn't pick it up?"
"What would you say to a business upstream who was dumping harmful chemicals into the stream you lived on?"

After most students are done with their drawings, ask them to share a few of their postcards and pollution messages out loud to the class. Incorporate the assessment questions into the closing discussion.

Postcard Template
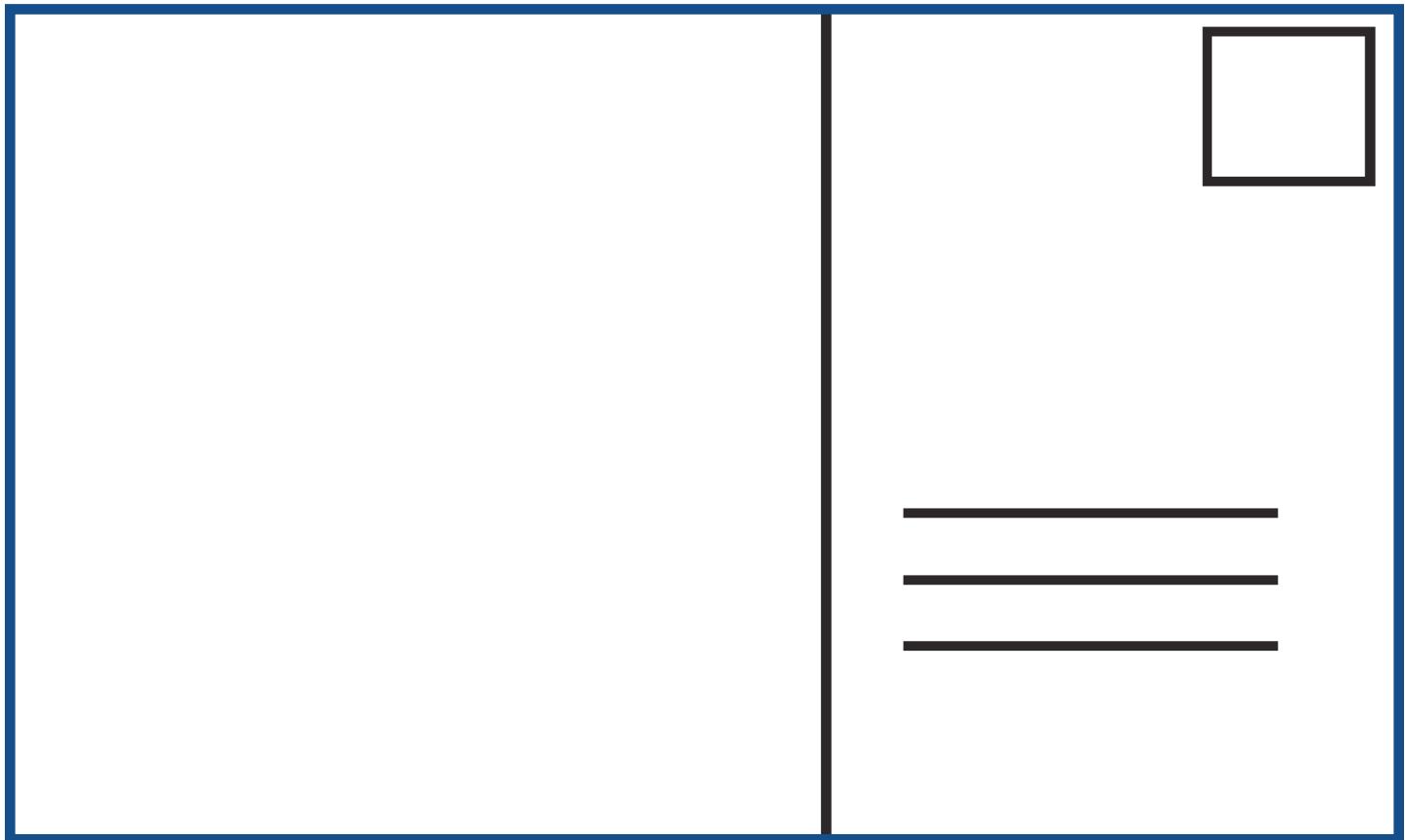
Assessment

Students will create pollution postcards, which will show their understanding of one type of common pollutant. Students will also be answering questions throughout and at the end of the activity.

Sample questions include:
- How does sediment in water affect how you can use the water?
- Which two pollutants increase when animal waste enters the water?
- How would you convince someone to stop polluting?
- Who are the different types of people affected by water pollution?
- How does pollution affect freshwater ecosystems?
- What can you do to help keep Athens-Clarke County streams clean?