Name: _____

project WET
WATER EDUCATION TODAY

Sum of the Parts

Summary

In this lesson you will:

- Differentiate between point and nonpoint source pollution
- Recognize that everyone contributes to and is responsible for a river or lake's water quality
- Identify Best Management Practices (BMPs) to reduce pollution

Pre-Activity Questions:

Let's start by thinking about rivers. You can use the image below as a guide.



Major Rivers and Lakes Used for Migration in the United States

1. What major river is close to you?

2. Which state does it start in? What state or states does it flow through?

Materials

Please gather these materials before starting.

Activity

- *Colored pens, pencils, crayons or markers*
- *Coins, beans, paper clips or other easily found items to represent trash*

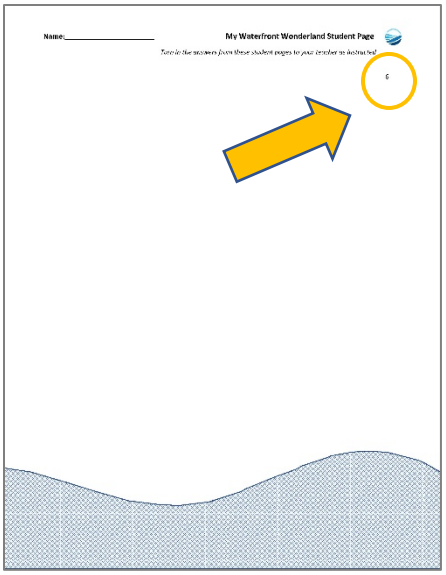
Warm Up

1. Think about some types of land use along one river as it flows through a community or a state. This could include, farming and ranching, recreation such as parks or playgrounds, and industry like a factory or paper mill. What are other types of land use you have seen or think may exist along waterways.

Activity

Congratulations! You have just inherited a piece of waterfront property and ten million dollars! You can use one million dollars to do whatever you want with the property.

1. Draw, write or symbolize how you would develop your property on the ***My Water Wonderland Student Page***. Be sure to label everything so that you know what you have developed. Come back to these questions after you have finished developing you land.



2. You may have noticed the number on your paper. This is because your piece of land sits along a river with other parcels of land surrounding it. Let's take a look at how your neighbors developed their land.

Neighbor 1

This neighbor created a water park! The park has slides, swimming pools, and a cafeteria. The neighbor also had to create a parking lot for guests to park.



3. Can you think of anything that could be a potential form of pollution or trash on this property?

Neighbor 2

Neighbor 2 created a nature park. There are walking paths, compostable toilets, and a wooden boardwalk along the river.







4. What potential forms of pollution or trash could be on this property?

Neighbor 3

This neighbor is a wastewater treatment plant that is off-limits to the public.



5. What potential forms of pollution could be on this property?

Neighbor 4

This neighbor built a mansion! It has a helicopter pad, tennis courts, and a yacht.







6. What types of pollution or trash could be from this neighbor?

Neighbor 5

Neighbor 5 has a farm. They are growing vegetables and have a herd of sheep.



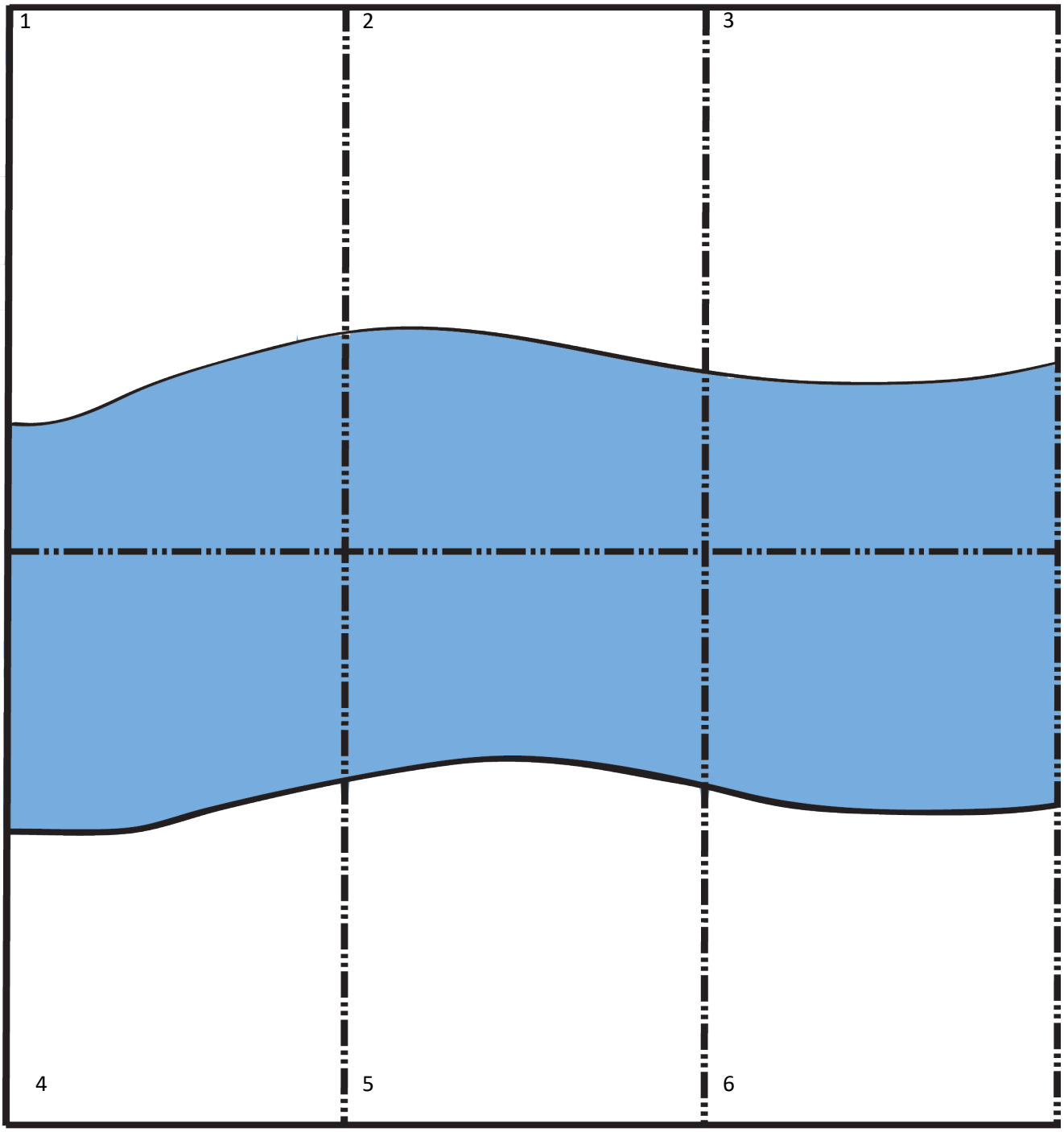




7. What potential forms of pollution could be on this property?

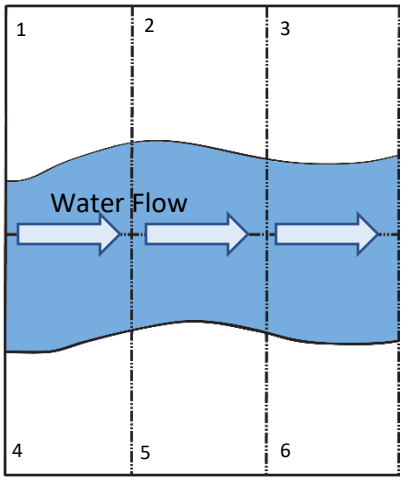
8. Next, think about your property. What types of trash or pollution may come from your propoerty?

9. Let's put this puzzle together! Note where each neighbor is located and write the types of pollution of their property. Be sure to include your property's (Neighbor 6) pollution or waster as well!



10. Use the items you collected to represent the pollution. Are there any common pollution categories? For example, pennies may represent litter or trash from people and paper clips may represent oil or gas leaks. Are there any that are unique to just one property?

    Write a key below for each item then place the items on each property on page 5 that contains that type of pollution.



11. Note the flow of water in your neighborhood. Which way does the water flow? You are_____ from your neighbors. Circle the correct answer.

    a. upstream

    b. downstream

12. Because the water flows to your property any pollution that enters the water will also flow to your property. Move all of you items on page 5 downstream to your property.

    Now, what types of pollution are on your property?

13. Which types of pollution occur on more than one property? List those here. These are called **nonpoint source pollution** because we can not point to it source.

14. Which types of pollution occur on ONLY ONE property? List those here. These are called **point source pollution** because we can point to it source.

15. Which type of pollution do you think is easier to regulate and stop the source?

    a. nonpoint source pollution

    b. point source pollution

    Why? Do you think this is?

16. Think about how you and your neighbors could help reduce pollution from entering the water. For each neighbor write one Best Management Practice (BMP) to prevent pollution. A BMP is a practice or action used to eliminate a problem such as pollution.

    Neighbor 1:

    Neighbor 2:

    Neighbor 3:

    Neighbor 4:

    Neighbor 5:

17. What are some Best Management Practices (BMPs) for preventing pollution on YOUR property?

18. How might reducing, recycling and reusing items reduce waste and water contamination?

19. Pollution impacts communities differently. Often, the areas that are more hard-hit from pollution are poorer neighborhoods with higher numbers of black, indigenous and people of color. Read the attached article on environmental justice. How and why are communities of color more impacted by water pollution and contamination than traditionally white neighborhoods?

Glossary

Best Management Practices (BMPs): Practices or measures used to eliminate a problem such as pollution.

Contaminant: Any substance that when added to water (or another substance) makes it impure and/or unfit for consumption or use.

Nonpoint source pollution (NPS): Pollution where the source of a contaminant is unidentifiable.

Point source pollution: Pollutants that are discharged from, and can be traced back, to an identifiable source.

Pollution: An alteration in the character or quality of the environment, or any of its components, that renders it less suited for certain uses.

Runoff: Precipitation that flows overland to surface streams, rivers and lakes.

Sediment: Fragmented organic or inorganic material derived from the weathering of soil, alluvial, and rock materials; removed by erosion and transported by water, wind, ice and gravity.

Water Manager: Person who manages the available water resources for a town, community or all persons living within a watershed.

Watershed: The land area from which surface runoff drains into a stream channel, lake, reservoir or other body of water; also called a drainage basin.

The Washington Post
Democracy Dies in Darkness

It's not just Flint: Poor communities across the country live with 'extreme' polluters

By **Chris Mooney**

Jan. 27, 2016 at 8:45 a.m. MST

As national attention focuses on Flint, Mich. — where lead-contaminated water flowed for over a year to a relatively poor, minority community — new research suggests that across the U.S., communities like these are more likely to be exposed to some of the most intense pollution.

In a new paper just out in the open-access journal Environmental Research Letters, sociologist Mary Collins of the State University of New York College of Environmental Science and Forestry and two colleagues from the National Socio-Environmental Synthesis Center and the University of Maryland examined what they term "hyper-polluters": Industrial facilities that, based on EPA data, generate disproportionately large amounts of air pollution. Then, they cross-referenced the location of these facilities with socio-demographic data from the 2000 census.

The result? "We find striking evidence that extreme emitters are likely impacting EJ [environmental justice] communities even more significantly than typical EJ scholarship might predict," the study said.

The study adds to a body of evidence showing that the U.S. continues to struggle when it comes to "environmental justice," a concept advanced by advocates and researchers to describe the reality that poor and minority communities tend to have disproportionate exposures to environmental hazards.

The industrial emissions examined in the new study were reported by close to 16,000 industrial facilities in the continental U.S. as part of the EPA's toxics release inventory program. The facilities were across a variety of sectors, ranging from mining to manufacturing, according to Collins. They did not include large power plants.

Examining this EPA data, the study found a significant disparity when it comes to how much different facilities pollute. "90% of toxic concentration present in the study area is generated by only 809 (about 5%) of facilities," the paper reported.

But what was particularly striking was cross-referencing this information with socio-economic data on the people living around the facilities, based on a nationally representative sampling of Census information. The highest polluting facilities were also more likely to be located in proximity to poor and

minority neighborhoods.

"It's certainly not news that minority and low income communities face more than what some would say is their fair share of pollution from industrial sources," says Collins. "We found that actually, the burden they face from these superpolluters was even more extreme than you would think."

The work is an advance in the environmental justice field, using big data approaches to underscore a familiar conclusion in a new way, says Andrew Jorgenson, an environmental sociology professor at Boston College who was not involved in the study.

"The substantive argument is something that's been around a long time, but this is a very sort of sophisticated, methodologically rigorous, and far reaching analysis that provides some generalizable analysis of this occurring across different regions," Jorgenson says.

"This study is different because it's looking at the largest polluters, and really focusing in on sort of the most egregious releases of chemical pollution," says Sacoby Wilson, an environmental health professor at the University of Maryland-College Park who was familiar with the study. "And so what it basically is saying is, you don't have to look at all the different facilities, if you just look at the superpolluters, the ones that release the most chemical emissions, we see that those facilities are also located in communities of color and poor communities."

Wilson said that because of this, the new research could help EPA engage in targeted, voluntary programs to help these facilities lessen their emissions, and get a bigger impact than might happen by trying to work industry-wide or nationwide.

The immediate problem in Flint wasn't about air pollution of the type involved in this study. Rather, it turned on a decision to switch the city's water supply from Detroit's to the Flint River to reduce costs. Still, it's relevant, say Wilson and Jorgenson. "Flint falls into this broad category, a community that is sort of structurally disadvantaged," Jorgenson says.

"I think what you see in Flint is really going to raise attention around environmental justice issues around the country, and also how you have these other environmental justice disasters that are looming out there," adds Wilson.

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