



Lesson 6: Keeping All of Our Waterways Clean

Snapshot

Looking outside, this lesson explores waterways (streams, rainwater runoff, drainage pollution) with a focus on urban waterways. Students learn about the water cycle and how to keep pollution out of waterways. Mercury in fish is also addressed.

Preparation and Materials:

- Poster 1, Take-Home Talk
- Flip chart and markers
- Black or white board
- You will take your students on a walk to see the nearest road with a storm drain. Storm drains are used to allow excess water from paved roads to drain away. They take many shapes and sizes. If you do not have a storm drain close by, you will walk along a road or path that often has some trash scattered. You will focus on all of the items—trash, leaves, pet waste, etc.—that you see on your walk. Be sure to follow your organization’s guidelines on traveling with children and be cautious around roads.
- Large sheets of paper for each child to make a poster
- Markers or crayons

Objectives—Students will be able to:

- define *rainwater runoff*, *drainage pollution*, *freshwater*, *saltwater*, and *potable*;
- identify three different types of waterways;
- explain three ways to stop drainage pollution; and
- explain how keeping our waterways clean benefits the entire community.

Vocabulary: rainwater runoff, drainage pollution, freshwater, saltwater, aquifer, precipitation, evaporation, water cycle

Procedure:

1. Introduction (*8 minutes*)
2. Water Cycle (*10 minutes*)
Optional Online Interactive: EPA Interactive Water Cycle (*5 minutes*)
3. Drainage and Storm Drain/Community Walk (*15–20 minutes*)
4. Reducing Pollution in Our Water (*5 minutes*)
Optional Activity: Coloring or Creating No Littering Signs (*10 minutes*)
Optional Activity: Community Clean-Up Planning (*10 minutes*)
5. Close and Take-Home Talk (*5 minutes*)



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1. Introduction

(8 minutes)

Review

Ask several students to share something that they remember from the previous lesson.

Prompts: What did you learn that you didn't know before? What did we talk about that you already knew? What surprised you from our last lesson? What are some of the new words that you learned from our last lesson? What can you do to positively impact the issue we learned about?

Do Ask

Close your eyes. I want you to travel back in time, slowly, to the start of your day. See everything you've done up until now in reverse. Think about all the things that you came into contact with—all the people you talked to, the things you've eaten and drunk, the stuff you've read, all of the things you've done. Reverse through the door to this room, reverse through coming into the building, slowly reverse through getting here, reverse through breakfast, slowly reverse through getting dressed, and reverse all the way back to being asleep. You are lying down and you're asleep. Now, let's play back your day with this question in mind: Which of the things in your day required water?

Ask

Go ahead and open your eyes. Who can tell me the first thing in his or her day that required water?

Prompts: Did any of you go to the bathroom when you got up? Brush your teeth? Have something to drink? What was the next thing? The vast majority of your activities require water—from the food you eat (plants need water to grow, animals that become meat need water) to exercising (your bodies need water), from the building you are in (buildings that are made of concrete require water to be mixed with the cement during construction) to electricity (which is used for lights, stoplights, walk signs, MP3 players, TVs, radios, and cable) that comes from hydropower, etc. *[Relate the actions to water as much as possible.]*



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2. Water Cycle

(10 minutes)

Ask

About 70 percent of the Earth is covered with water. That's a lot of water! Where is most of that water?

Prompt: If we look at a map, there's a lot of what color? [*Blue.*] Blue represents the oceans.

Explain

But did you know that less than 1 percent of all the water on Earth can be used by people? The rest is saltwater (the kind you find in the ocean) or is permanently frozen and we can't drink it, wash with it, or use it to water plants. As our population grows, more and more people are using up this limited resource. Therefore, it is important that we understand where our water comes from and how to use our water wisely and not waste it.

Ask

So, where do we find the 1 percent of water that we can use? Where do we find freshwater? [*In lakes, streams, rivers, and rain.*]

Explain
Ask

Let's take a look at the life cycle of a drop of freshwater—the kind we can drink—when it starts as a raindrop. Rain is also called **precipitation**, something I'm sure you've heard the weather reporter say. Well, precipitation happens when there's too much water in the air and it can't hold onto it anymore. It will rain, sleet, snow, or hail. How can there be water in the air?

Prompts: Have you ever gone outside and noticed that the air felt heavy or wet? We call that humidity—this is a good example of water in the air. When the water in the air and the clouds gets to be too heavy, it rains.

Do
Ask

[*Show **Poster #1** (life cycle of water).*] So, the rain or snow or hail comes down and fills up our lakes, streams, and oceans. Where else does the precipitation go?

Prompts: Does the rain just fill up the streets? Does it stay on top of the soccer fields? It soaks into the Earth and drains through our sewer systems.

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2. Water Cycle (continued – page 2)

Optional Online Interactive: EPA Interactive Water Cycle (5 minutes)

Do

Share the EPA Interactive Water Cycle – Interactive Tool at www.epa.gov/safewater/kids/flash/flash_watercycle.html

Explain

The water that soaks into the ground is stored there until it is needed. The water stored way underground is called an aquifer/ground water. Many people pump water directly from the aquifer through a well and use it for their drinking water.

Explain
Ask

So, water falls and gets soaked up by the ground or added to lakes. What happens next?

Explain

Remember those humid days, the days when the air feels muggy? Do those days happen in the summer or the winter? In the summer. As the sun's rays heat up the lakes and streams and oceans and the ground where the water is stored, vapor is formed.

Ask

Think about when you're cooking and you boil a pot of water—as the temperature of the water increases, what happens?

Prompts: How do you know it's hot? The water starts to boil and steam comes off of it. This steam is vapor. And the vapor goes into the air. This is called **evaporation**.

Explain

The sun is heating up all this water and the vapor is traveling upward because it's hot. When it cools and moves higher up, it turns into a liquid again and gathers in clouds.

Ask

What happens next?

Prompts: This is a cycle: We started with rain—so we have to end up there again.

Explain

The clouds send down precipitation and the cycle starts all over again.



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3. Drainage and Storm Drain/Community Walk (15–20 minutes)

Ask

In a city, where does the rain go when it comes down? Does it soak into the Earth? What is covering a lot of cities? *[Roads, asphalt, and concrete.]*

Explain
Ask

Water can't soak into the roads and sidewalks, so it pools on the concrete or it runs along the surface. After a really hard rainfall, what do you see? In the roads?

Prompt: Have you seen a storm drain before?

Review

Storm drains are openings on the sides of roads that allow water to drain. The water goes down the drain and into a pipe system, which brings that water to a body of water close by. Storm drains will often have painted on them "*[insert name of body of water]* drainage." All of the rainwater rushes down these storm drains. After a big storm, it sometimes looks like a river flowing to the drain.

Ask

What is in the river flowing to the drain?

Prompts: What have you seen? What is in the road that could get swept into the drain?

Explain
Do

All of the things that pool together when it rains and go down the storm drain end up flowing into the streams and lakes that we use for our drinking water. And they can contaminate it. We call this **rainwater runoff**. We're going to take a walk down to the closest storm drain and take a look at everything we spot along the way that might end up in the *[insert name of closest body of water (could be a dam, river, etc.)]*. As we're walking, call out the items that might be swept into the storm drain as you see them.

Explain

Not all communities have a lot of storm drains. But the same way that trash gets swept into storm drains it gets swept other places as well by rain and wind. Trash and oil from cars and household chemicals will often make it into the water system through storm drains or streams.

Teacher Note: Be sure to take a pen and paper with you to note everything that the children see. Depending on how busy the area by the storm drain is, you can finish the lesson outside or resume it when you return to the classroom.

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3. Drainage and Storm Drain/Community Walk *(continued – page 2)*

Do
Ask

Review the list of items noted. Ask what else is often in the street that the students didn't see today. Be sure that they note the following: cans, bottles, paper trash, cigarette butts, food trash, oil from cars, and pet waste. Remind students that people sometimes dump chemicals like paint or oil on the road and those things can be added to the rainwater runoff as well.

Explain
Ask

Imagine a bathtub full of all these things that you just saw on the street—would you want to get into the bathtub to wash? Or would you want to drink that water? While much of the water we drink goes through a treatment process to make it safe for us, let's think about the rivers and lakes and bays that these storm drains feed into. How would all this garbage impact the life in that lake?

Prompts: How would this impact fish and plants? The animals that drink that water? What animals would be impacted? Might we end up eating fish from that lake?

Explain
Ask

One of the big concerns with water pollution is mercury. What is mercury? Mercury is a toxic metal that is found naturally in coal and is released when coal is burned by power plants. When it's released, it falls to the ground and enters our waterways. When mercury mixes with water, it becomes very toxic and can end up in the fish that we eat. If we ingest mercury, it can harm us by impacting our brain development and functioning. Pregnant women have to be especially careful about mercury because it can impact the baby they are carrying.

Ask

So, should we avoid fish altogether? No! Fish is a great part of a healthy diet. So, what do we do?

Explain

If you are buying fish, be aware of which fish your local health department recommends that you avoid in your area. If you are catching your own fish, check to make sure that the waters you are fishing in are clean—again, your local health department will know. When you cook the fish you caught, remove the skin, head, tail, and organs before cooking. Mercury can be concentrated in these areas. Avoid frying fish or eating fried fish—frying locks in the pollutants.

Ask

We've talked about everything being connected and about balance. How does polluted water impact our health?

Prompts: If the water is polluted, will it take more work at a water treatment plant to clean it? We'll talk about the water treatment process in our next lesson. Will it take more energy to do this? Where will we get this energy—will we need to burn more fossil fuels and thus create more greenhouse gases? Will this impact air quality and climate change? All of these elements are interconnected. How will it impact you?



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4. Reducing Pollution in Our Water

(5 minutes)

Ask

How do we keep these things out of our waterways? What can we do?

Explain

Put garbage where it belongs. Never pour chemicals or pesticides on the ground. Pick up after our pets. Pick up litter. Don't throw things down the storm drain. Recycle used car oil at landfills or garages. Educate people about how litter can hurt our waterways.

Optional Activity: Coloring or Creating No Littering Signs *(10 minutes)*

Explain

Color or create No Littering signs for use in the teaching space or at home. Now that we know how important it is to keep our roadways and parks clean, we want to share that knowledge. Each of you (or in pairs) will make a poster that lets others know how important it is to clean up after pets or put trash where it belongs.

Do

Pass out large sheets of paper and markers or crayons.

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4. Reducing Pollution in Our Water *(continued – page 2)*

Optional Activity: Community Clean-Up Planning *(10 minutes)*

Explain

We just saw all the trash and pet waste and leaves on our walk and that was a relatively small area we covered. Now that we know how harmful these items can be to our waterways, I think we should do something about it.

Ask

What can we do?

Prompts: Not litter, tell others not to litter, pick up trash.

Explain

What if we organized a community clean-up day of [insert local park or road that needs to be cleaned up]? How would we do it?

Prompts: Who would we want to involve? How would we tell folks about it? When should we do it?

Do

Guide the students through the process of planning a clean-up day for the near future.



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5. Close and Take-Home Talk

(5 minutes)

Explain
Do

Close your eyes and take a nice deep breath. We've covered a lot today. We talked about the water cycle. Raise your hand if you can tell the class about the four steps of the water cycle—where do we start? *[Call on a student. Go through all four steps: precipitation, runoff and groundwater, evaporation, and condensation]*

Explain
Ask

We also discussed storm drains and went on a trip to see what gets into our waterways through the storm drains. What are some ways that we can stop the pollution of our waterways? You can open your eyes now.

Take-Home
Talk

The coolest part about learning something new is sharing the knowledge. Tonight, when you get home, I want you to talk with your family about the things that we learned today. Look around your neighborhood to see if there is trash by the storm drains. Be sure not to litter, and pick up trash and put it in the garbage when you see it. Challenge your family to think of ways that you can all help to protect the waterways around us.

Explain
Do

*[Pass out **Take-Home Talk.**]* This Take-Home Talk sheet has some things that you can share with your family and some activities that you can do at home. See what you can accomplish on the sheet and we'll talk about it the next time we meet.