

# TEACHER OVERVIEW

Ecological Impacts  
3rd — 5th Grade

## Nature Vision Student Packet

The materials contained within have been created by Nature Vision, an environmental education nonprofit organization that brings programming to schools and local greenspaces for over 70,000 PreK-12th grade students each year in King and Snohomish Counties. This work from home curriculum materials packet is designed to foster an understanding of the importance of water and its integral role in supporting life and shaping our planet. Packets can be completed either independently, or with the help of an adult caregiver. Each day of the week offers materials building on previous days learning, offering a variety of activities including, art, writing, field exploration, and kinesthetic activities.

These materials are provided to you by City of Auburn Utilities, City of Bothell, City of Lynnwood, and grants from King County Flood Control District, and King County Wastewater Treatment Division. Learn more by visiting:

- City of Auburn Utilities: [https://www.auburnwa.gov/city\\_hall/public\\_works](https://www.auburnwa.gov/city_hall/public_works)
- City of Bothell: <http://www.bothellwa.gov/surfacewater>
- City of Lynnwood: <https://www.lynnwoodwa.gov>
- King County Flood Control District: <https://www.kingcounty.gov/services/environment/water-and-land/flooding/flood-control-zone-district.aspx>
- King County Wastewater Treatment Division: <https://www.kingcounty.gov/depts/dnrp/wtd.aspx>

*Thanks to Cascade Water Alliance for providing the accompanying series of student packets: Ecosystems, Watersheds, and Humans and Water. To learn more please visit: <https://cascadewater.org/>.*

This unit supports NGSS Performance Expectations across various disciplines, as well as supporting K-12 Integrated Environmental and Sustainability Standards. These are listed at the bottom of this page. Teachers will be supplied with PDF formats of materials to be emailed to families, or teachers may print and send to students to complete at home.

In this packet, students begin with an introduction to the concept of stormwater and how it moves through our environment. Next, students explore how stormwater impacts our streams and rivers in addition to the impact it has on our marine environment. Students will then learn about the way wetlands collect and filter our stormwater, followed by ways that we can help to protect and restore the environment in our local watersheds.

If you have any further questions or concerns regarding this packet, please email our Office Coordinator at [info@naturevision.org](mailto:info@naturevision.org).

### Grades 3-5

**Supports NGSS Performance Expectations:** 3-LS4-4, 3-ESS3-1, 4-ESS3-2, 4-ESS3-2, 5-ESS2-1, 5-ESS3-1, 3-5-ETS1-2.

Grades 3-5
Day 1 - Watersheds
Day 2 - Storm Drains, Rivers, and Streams
Day 3 - Wetlands
Day 4 - Puget Sound and Marine Ecosystems
Day 5 - Stewardship

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# PARENT/CAREGIVER OVERVIEW

Ecological Impacts  
3rd — 5th Grade

Welcome to Nature Vision's student packet for home use. Nature Vision is an environmental education nonprofit organization that brings programming to schools and local greenspaces for over 70,000 PreK-12th grade students each year in King and Snohomish Counties. We are excited to be offering this version of our programming directly to students at home!

This packet is designed to be completed over the course of one week, with each day focusing on a different aspect of environmental science and stewardship. The majority of these materials can be completed independently, but we thought it would be important to provide background information for any adults who may be helping to complete or answer questions. We've included the basic learning objectives for each day along with some vocabulary.

These materials are provided to you by City of Auburn Utilities, City of Bothell, City of Lynnwood, and grants from King County Flood Control District, and King County Wastewater Treatment Division. Learn more about caring for our water by visiting:

- City of Auburn Utilities: [https://www.auburnwa.gov/city\\_hall/public\\_works](https://www.auburnwa.gov/city_hall/public_works)
- City of Bothell: <http://www.bothellwa.gov/surfacewater>
- City of Lynnwood: <https://www.lynnwoodwa.gov/Home>
- King County Flood Control District: <https://www.kingcounty.gov/services/environment/water-and-land/flooding/flood-control-zone-district.aspx>
- King County Wastewater Treatment Division: <https://www.kingcounty.gov/depts/dnrp/wtd.aspx>

Challenge yourself to post all the things you are doing with your friends and family to prevent pollution and protect our water!

- City of Auburn Utilities: Tag @auburnwa and include the hashtag #auburnwa
- City of Bothell: Tag @BothellWaUSA and include the hashtag #PugetSoundStartsHere
- City of Lynnwood: Tag @LynnwoodWA and include the hashtag #Lynnwood
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- King County Wastewater Treatment Division: Tag @kingcountywtd

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Stay connected with Nature Vision! Follow us for updates @naturevisionorg*



**NOTE: Students may require support in reading directions and/or completing some tasks.**

Unless otherwise noted, images courtesy of freepik.com

# PARENT/CAREGIVER OVERVIEW: DAY 1

## Watersheds

**Background Information:** Stormwater is all of the water that starts as precipitation that moves over and through our environment. Stormwater is the source of water for plants in our soil as well as how our surface water is replenished. There are two main issues communities face when managing stormwater: flooding and contamination. Stormwater issues create some of the largest environmental challenges that people deal with in our urban environments.

**Learning Objectives:** Students will learn the basics of watersheds and model how water flows through the landscape. After creating the model, they will begin to understand how stormwater carries pollution from one place to another.

### **Activity: Watershed and Stormwater Model**

- **Overview:** Students create a basic model of stormwater moving through an environment using everyday materials to explore how this water collects and moves contamination through a watershed
- **Parent/Caregiver Tasks:** Provide supervision and help with gathering materials

### **Optional Activity: What's Your Favorite Place With Water?**

- **Overview:** Students write about their favorite freshwater area and consider the impacts that stormwater has, or could have, on that area
- **Parent/Caregiver Tasks:** None

### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

## PARENT/CAREGIVER OVERVIEW: DAY 2

### Storm Drains, Rivers, and Streams

**Background Information:** In developed areas, there is less of an opportunity for stormwater to be absorbed by the soil and soak into the earth. Therefore, stormwater needs to be controlled and directed as it moves through urban environments. As a result, this water moves more quickly through these areas which causes a greater risk of flooding while also causing greater levels of contamination. Storm drains are the main piece of infrastructure that we use to manage our stormwater. Storm drains direct water and reduce flooding. However, because they directly send water to the closest stream, they also play a role in moving pollution from the urban environment into our freshwater sources.

**Learning Objectives:** Students will develop an understanding of how quickly water moves through urban environments and carries greater amounts of pollution. Storm drains act as a way to manage the water when the environment is unable to absorb it.

#### **Activity: Drains-to-Stream Game**

- **Overview:** Students play a game to explore how water and pollution move through urban and rural environments, which allows them to model different ways of reducing the amount of contamination that may enter our streams and rivers
- **Parent/Caregiver Tasks:** Assist with setting up the game

#### **Optional Activity: Runoff Art**

- **Overview:** Students complete an art project with oil and water to understand how pollution can cause problems in our environment when mixed with stormwater
- **Parent/Caregiver Tasks:** Provide supervision and support with materials

#### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: DAY 3

## Wetlands

**Background Information:** Wetlands are a type of landscape that stay wet for most of the year. Depending on where they're located and the types of vegetation in them, wetlands can take many forms including ponds, marshes, swamps, fens, bogs, sloughs, and more. While they may be called different names, all wetlands share three characteristics: every wetland contains water, saturated soil, and water-tolerant plants. Wetlands are habitats for a multitude of animal and plant species as they are each a vital ecosystem that provides plenty of food and nutrients for organisms. Wetlands also help prevent flooding by holding excess rainwater within their soil. The soil also acts as a filter because it traps pollutants that flow into them via storm drains.

**Learning Objectives:** Students will learn about the many different types of wetlands and become able to identify what makes an environment a wetland by understanding the three defining characteristics of wetlands. They will become able to identify wetlands and their unique traits. Lastly, students will discover the various functions of wetlands and the impact of stormwater upon this ecosystem.

### **Activity: Wetland Sponge Model**

- **Overview:** Students use sponges to model how saturated soil can more effectively absorb and filter water compared to that of unsaturated soil, or hard and dry surfaces
- **Parent/Caregiver Tasks:** Provide supervision

### **Optional Activity: Build Your Own Wetland Filter**

- **Overview:** Students work with common household items to recreate the functions of a wetland filtering water
- **Parent/Caregiver Tasks:** Provide supervision

### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: DAY 4

## Puget Sound and Marine Ecosystems

**Background Information:** Puget Sound is made up of the inland seas of Washington state. It is an estuary where freshwater rivers and streams meet saltwater coming in from the Pacific Ocean. Puget Sound also includes the land of our local region that surrounds these inland seas, from the Cascade Mountains, to Olympia, to the Olympic Mountains, and north to the Canadian border. The various waterways that flow through this watershed ultimately drain into Puget Sound, thus connecting this entire region. The land and water surrounding Puget Sound serves as a habitat to 211 fish species, 100 sea bird species, and 13 marine mammals species. Puget Sound is a biodiverse region, and is heavily impacted by stormwater runoff pollution. With many major cities inside of this region, the many storm drains found in these cities lead polluted stormwater into Puget Sound.

**Learning Objectives:** Students will learn about estuaries and be able to identify Puget Sound as a large estuary in our region. They will understand that many local freshwater rivers and streams drain into Puget Sound. As Puget Sound is home to many iconic and important species, students will consider how the health of these animal and plant species is tied to the health of Puget Sound. They will be introduced to the impact of stormwater runoff pollution on the water quality of Puget Sound, and consequently to those that inhabit this vast body of water.

### **Activity: Who Polluted Puget Sound?**

- **Overview:** Students complete a story-based activity where they consider the source of pollution in Puget Sound and the actions we can take to manage that impact of that pollution
- **Parent/Caregiver Tasks:** None

### **Optional Activity: Video**

- **Overview:** Students watch a video explaining stormwater outfall from Seattle and answer questions about the makeup and the source of this polluted water
- **Parent/Caregiver Tasks:** Provide permission, supervision, and technical support

### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: DAY 5

## Stewardship

**Background Information:** Stewardship is how we care for the natural resources that all living things need to survive – such as water. Stewardship can include conservation of natural resources, in addition to thinking and acting carefully about how we interact with the world around us. Humans can have an impact on their environment in many ways, such as negatively impacting the environment when we contribute to pollution. Stewardship can remedy this impact and ensure a positive change that will help keep our environment clean for all living organisms in our habitat.

**Learning Objectives:** Students will combine the knowledge gained throughout the week to consider ways they can support the environment. They will learn to focus on pollution prevention by carefully considering their daily habits, behaviors, and usage of materials that can contribute to stormwater runoff pollution.

### **Activity: Eco Audit**

- **Overview:** Students and adults make a careful observation of the areas near their homes and neighborhoods to consider how stormwater can impact their environment while also brainstorming activities they could do to reduce this impact
- **Parent/Caregiver Tasks:** Provide supervision and support while participating in the activity together

### **Optional Activity: Caring for Your Neighborhood Stormwater**

- **Overview:** Students are encouraged to think about ways that they can help prevent stormwater flooding and pollution either in a personal space or as part of a wider community action
- **Parent/Caregiver Tasks:** Provide supervision and support

### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: VOCABULARY

## DAY 1

**Precipitation:** Water that falls from the sky in the form of rain or snow

**Pollution:** Materials that negatively impact our environment

**Stormwater:** Water that flows over the earth as a result of precipitation

**Water cycle:** The movement of water to and from the earth and the atmosphere

**Watershed:** All of the land that directs our stormwater to a particular place

## DAY 2

**Infiltration:** The process of water soaking into the earth

**Runoff:** The water that moves over the surface of the earth

**Storm Drain:** A drain in the streets of our cities that connects with other drains that sends water directly to the nearest stream

## DAY 3

**Absorbed:** Soaked into the ground

**Bioswale:** Ditches designed to concentrate and move stormwater runoff while removing debris and pollution

**Contaminated:** Made dirty by pollution

**Diverse:** Having variety, many different kinds of species

**Saturated:** Areas that are soaked or filled with water

**Sediment:** Loose soil carried by water

**Wetlands:** Areas with water loving plants that are filled with water part of the year

## DAY 4

**Estuaries:** The tidal mouth of a large river, where the tide meets the stream

**Ecosystem:** A community of interacting organisms and their physical environment

**Pollutants:** A substance that pollutes something, especially water or the atmosphere

**Outfall:** Discharge point of a waste stream into a body of water

## DAY 5

**Audit:** A detailed inspection

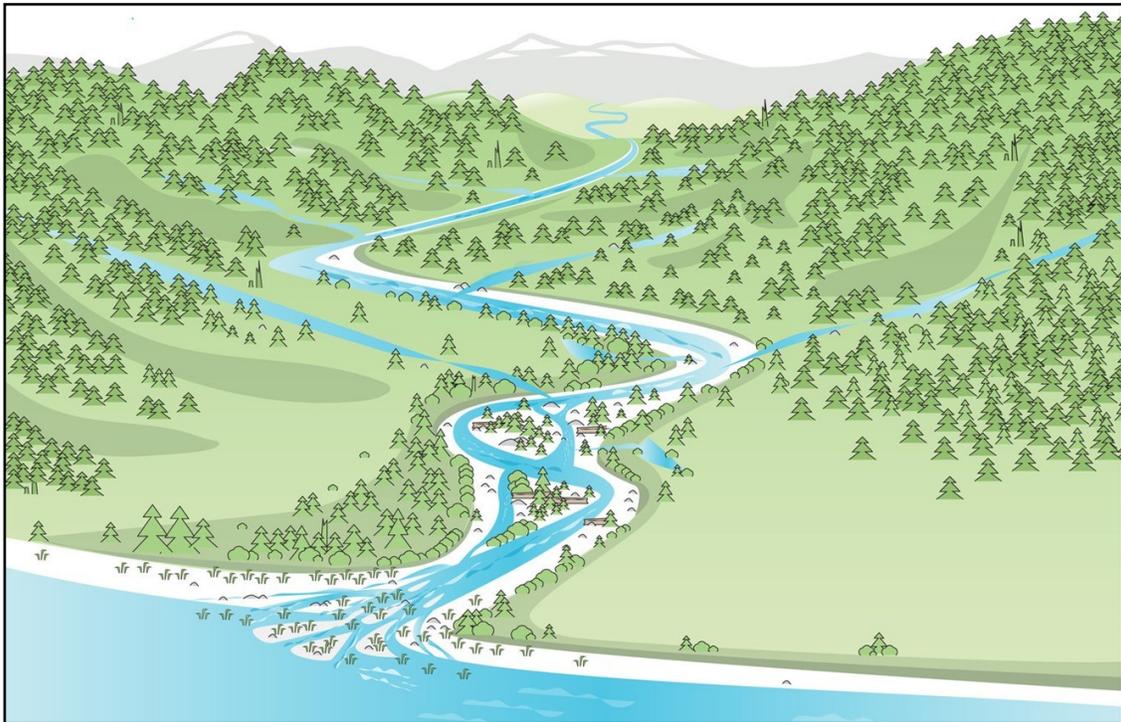
**Stewardship:** Taking care of something; being a protector

# DAY 1

## Watersheds

Every living thing depends on the **water cycle** moving water around our planet. Water that falls on the earth as rain or snow is called **precipitation**, but where does that water go after it falls on the ground? It moves through our **watershed** by flowing downhill and becoming what we call **stormwater**. That's all the water that moves over the surface of the earth that comes from rain, or melting snow and ice.

Stormwater is a really important thing to know about, because every living thing needs water to survive, but it can also cause problems for the environment and living things including causing floods and carrying **pollution** from one place to another. This packet will help us learn about stormwater and how we can manage the problems it can cause and make sure plants and animals get the clean water they need.



### **Vocabulary**

**Precipitation:** Water that falls from the sky in the form of rain or snow

**Pollution:** Materials that negatively impact our environment

**Stormwater:** Water that flows over the earth as a result of precipitation

**Water cycle:** The movement of water to and from the earth and the atmosphere

**Watershed:** All of the land that directs our stormwater to a particular place

# Main Activity

## Watershed and Stormwater Model

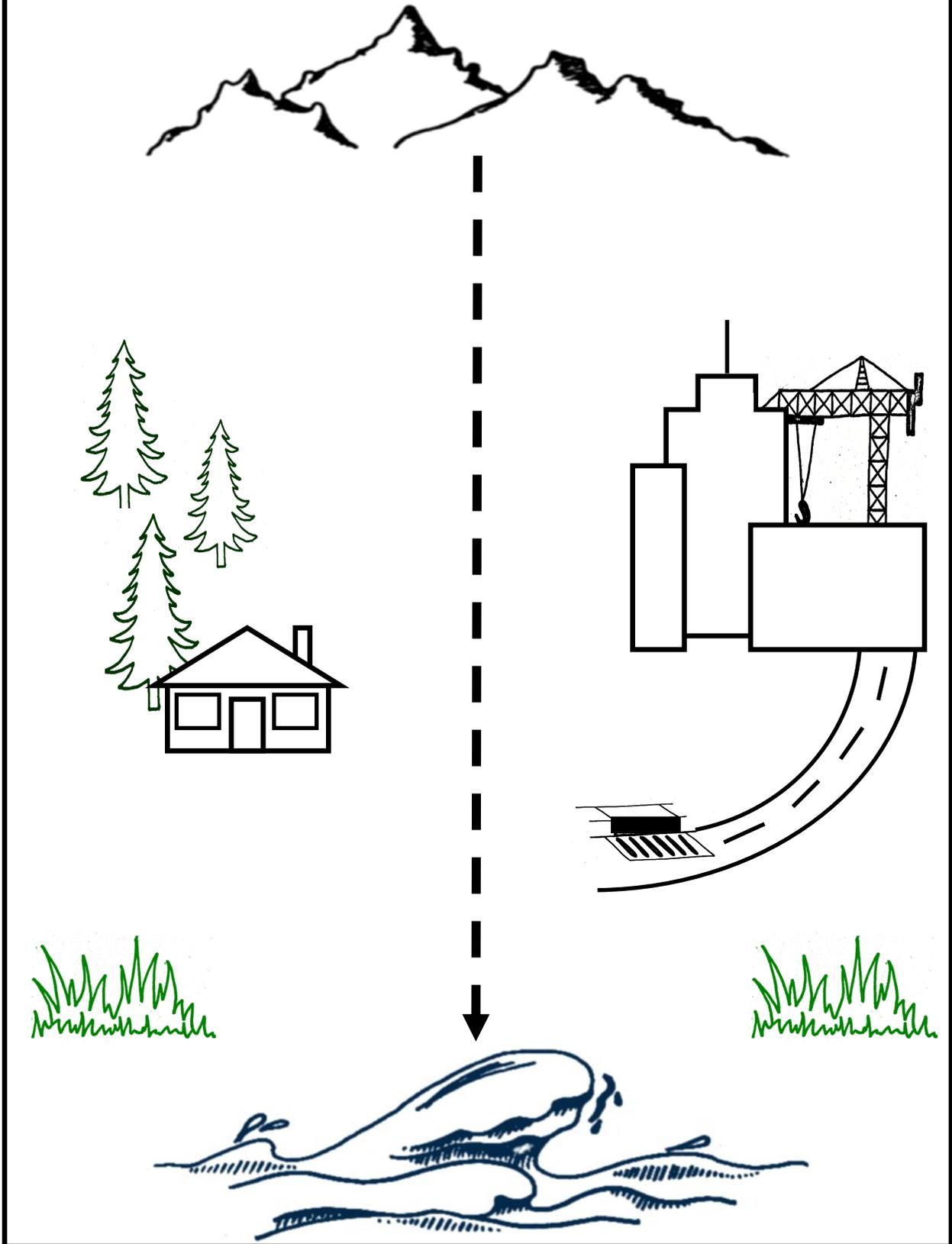
You can make your own model of how stormwater moves through our environment using a piece of cardboard, markers, and some common materials that you have in your home. This experiment will help us see what happens when clean water moves over the surface of the earth, and what happens when water comes in contact with pollution causing dirty water to move over the surface of the earth.

**Materials:** Plastic container, cardboard (recycling from a package, cereal, or pizza box will work!), markers, spray bottle with water (optional), paper

### Instructions:

1. Find a piece of cardboard that is about 24 inches long and 12 inches wide. Fold the longer sides up about 1 inch from the edge.
2. Label one of the shorter sides as “Mountains” and one of the shorter sides “Ocean”. Draw some mountains on the “Mountains” side of the model, and draw the ocean and some animals that live there on the “Ocean” side.
3. Decorate the space between these edges with things that you could find in the entire watershed environment, like forests, rivers, roads, and cities.
4. Place the side labeled “Mountains” on something or have someone hold it up so it’s a little higher up than the “Ocean” side.
5. Set the box with the plastic container underneath the “Ocean” to collect the water!
6. Make it rain! Use a spray bottle or small amount of water to create a rainstorm in the mountains. **Be sure that you have adult permission and are being careful so things don’t get very wet or messy.** Consider doing this outside, in the bathtub, or lay down some towels to catch any extra water.
7. Now, we’re going to make a rainstorm on our watershed again, but first we need to add some materials to your model to represent pollution. You could use cocoa powder, small pieces of paper, gum wrappers, food coloring or anything you think can be carried by the water. Put these things on your model where you think pollution might be. For example, your pollution could be placed by the cities or roads that you added to your model.
8. Make it rain a second time and notice the differences between the two rainstorms you made. Discuss the questions with your parent/caretaker, or write down the answers on a piece of paper:
  - What happens to your pollution?
  - What did you notice about how the water moved over your model?
  - Where does it start and where does it end?
  - What does this mean for the water that moves through in our environment?
  - What does this mean for the people, plants, and animals that live downstream from a place where there is pollution?

Watershed and Stormwater Model Guide Image



# Optional Activity

## What's Your Favorite Place With Water?

Think about the last time you enjoyed visiting a place nearby with lots of water. Maybe you go swimming in the summer, fishing in the fall, or exploring and nature watching in the springtime. What do you think would happen if pollution got into that water? How would you feel? What would happen to the plants and animals that live there? Write a short story in the space below about how you enjoy that water in your area!

**Materials:** Writing utensil

# Optional Activity

## Stormwater Stewardship Challenge for Day 1

The water that moves over the surface of the earth does amazing things. It keeps plants and animals alive, and it helps provide humans with recreation and exercise. But, when there is too much water where it shouldn't be, or if that water gets dirty, then it becomes a problem. Maybe you have noticed litter by a storm drain, or your back yard or school playground has gotten flooded.

**Materials:** Writing utensil, markers/crayons/colored pencils, computer/phone/tablet, internet connection

Think about a time that you've seen a problem with stormwater in your neighborhood and draw a picture of it and write a short paragraph about how you might solve this problem.

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean:

- If you live in City of Auburn: Tag @auburnwa and include the hashtag #auburnwa
- If you live in City of Bothell: Tag @BothellWaUSA and include the hashtag #PugetSoundStartsHere
- If you live in City of Lynnwood: Tag @LynnwoodWA and include the hashtag #Lynnwood
- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd.

## DAY 2

### Storm Drains, Rivers, and Streams

Yesterday, we learned about our watersheds and how stormwater moves through them from the mountains all the way to the ocean. We also explored how water can carry pollution and other materials with it as it moves over the land. As it moves, stormwater carries things with it along the way. Today, we will look more closely at how we manage stormwater.

Stormwater can soak into the earth, which is called **infiltration**, or it can move over the earth, which is called **runoff**. Infiltration is how plants get the water they need to grow. Runoff is how our streams, ponds, rivers, lakes, are filled with water.

Water moves differently through natural areas than it moves through our cities. When water flows over grass and other areas where there is more of an opportunity for infiltration, it moves more slowly and carries less material or pollution with it. When water moves through cities, there is less opportunity for the water to soak into the ground. Therefore, it needs to be directed and moved so our cities do not flood. **Storm drains** are really helpful because they move the water from the street to a stream so streets and houses flooding does not happen! That also means that any pollution that is being carried by that water in our cities also gets sent directly into that stream. That is a problem for the plants and animals that live in that water, and any people that might need that water.

You've probably seen some signs by the storm drains in your neighborhood. Sometimes they say "drains to stream". This is a reminder to us that anything that goes into those drains goes straight to the closest body of water. The water that comes from our cities has a really big impact on the wildlife that live in our rivers and streams, and everything that depends on that water.

#### **Vocabulary**

**Infiltration:** The process of water soaking into the earth

**Runoff:** The water that moves over the surface of the earth

**Storm Drain:** A drain in the streets of our cities that connects with other drains that sends water directly to the nearest stream

# Main Activity

## Drains-to-Stream Game

This game will show us how stormwater moves through our cities, and what happens to the pollution it picks up along the way.

**Materials:** Game board, water tokens, pollution tokens

### Instructions:

1. Start by placing water tokens on your game board. You can place them as far up or down on the game board as you would like, but each column must have one water token.
2. Next place pollution tokens on your game board. Place 3 in the “nature” side, and 5 in the “city” side. This shows us that in general there is more pollution in a city than there is in nature.
3. Finally, place 5 storm drain tokens in any open spots on the “city” side of your board.
4. Each turn move your water forward 1 space if it is on the “nature” side of the board, and two spaces if it is on the “city” side of the board.
5. If your “water token” runs into a “pollution token”, the water token carries the pollution and they both move together at the same speed.
6. If your water token is on the “nature” side of the board, it will soak into the ground (infiltrate) after three turns and you remove both the water and pollution token from your board.
7. If your water token is on the “city” side of your board and it meets a storm drain token, move it and any pollution tokens with it directly into the stream because storm drains carry water directly to the nearest body of water.
8. After 5 rounds, how many of your water/pollution tokens reached the stream from the “nature” side? How many water/pollution tokens reached the stream from the “city” side?
  
9. Replace your water and pollution tokens and try again. Can you set the board up so that you get as little pollution in the river as possible? How were you able to accomplish this?

*You can always draw the game board on a separate piece of paper if you cannot print.*

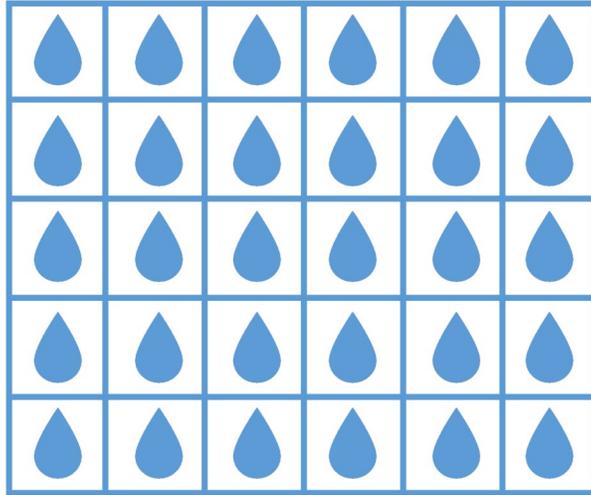
Nature			City		
FINISH	FINISH	FINISH	FINISH	FINISH	FINISH

**TURN COUNTER**

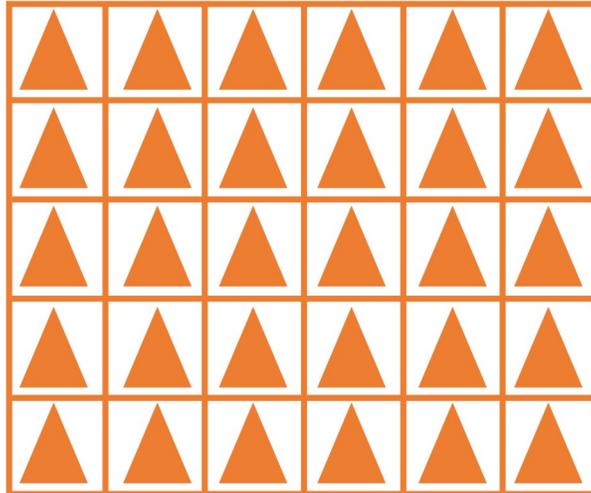
1	11
2	12
3	13
4	14
5	15
6	16
7	17
8	18
9	19
10	20

**Game Tokens**

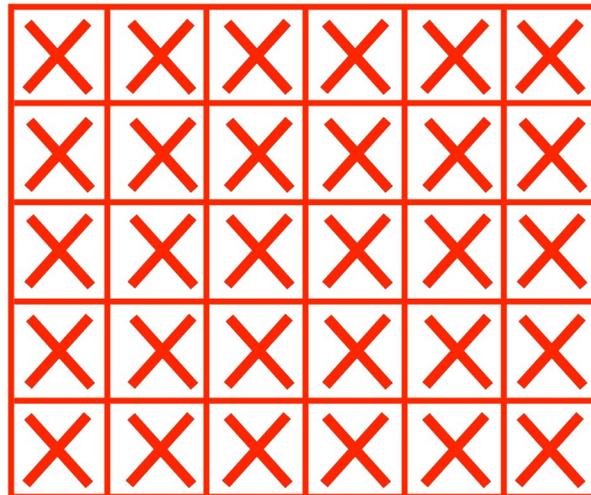
Water Tokens



Storm Drain Tokens



Pollution Tokens



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# Optional Activity

## Runoff Art

One of the reasons that oil is such a big pollution problem in the runoff from our streets is that it sits on top of the water and spreads out from the initial point of contamination. In other words, if water with oil in it reaches a large body of water, it becomes a problem for a very large distance and a very large amount of water. All of the organisms living in that water now have oil pollution in their habitat. Let's do an experiment with water that's polluted with oil to understand what it looks like and how it spreads.

**Materials:** Vegetable oil, food coloring or liquid watercolors, watercolor paper or cardstock cut into quarters, droppers (optional), dishes and utensils (pie pan or baking dish, small cups or bowls, forks, spoons)

### Instructions:

1. Mix Oil and Color: Pour a small amount of vegetable oil into a dish and add food coloring.
2. Add Oil + Color Mixture to Water: Pour about an inch of water into a shallow pie pan or baking dish.
3. Marble your Paper: Lay your paper on top of the water.
4. Dry: Let your marbled paper dry and hang up your art when it's done!

Look at this example!



## Optional Activity

### Stormwater Stewardship Challenge for Day 2

There are Orca or Killer Whales that live in Puget Sound. We call these Orca whales the Southern Resident Orca whales. There are only 73 Southern Resident Orca whales remaining in Puget Sound. These numbers are very low! The Southern Resident Orca whales are impacted by stormwater pollution flowing into Puget Sound through storm drains. Our Southern Resident Orca whales need clean water to survive. Can you help the Southern Resident Orca whales by raising awareness about stormwater runoff pollution in Puget Sound? There are simple solutions to make sure we are keeping Puget Sound healthy for all species, including our Southern Resident Orca whales!

**Materials:** Writing utensil, computer/phone/tablet, internet connection

Create a catchy slogan to raise awareness for our Southern Resident Orca whales. A slogan is a short phrase or set of words that helps to remember something. For example, a common slogan you might have seen or heard before about keeping storm drains clean: "Only Rain Down the Storm Drain" The slogan can be about Orcas, stormwater pollution, or a combination of both! Your slogan can rhyme or not rhyme, it can be short or even extra short. As long it helps people remember to keep our stormwater clean!

*Your Catchy Slogan:*

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Some key words to consider for your catchy slogan: *you can use others too!*

- Whale
- Puget Sound
- Pollution
- Stormwater
- Storm drain
- Solution
- Clean
- Healthy
- Water

There are more resources available online that will help you learn more about our Southern Resident Orca Whales! **With an adult**, learn more about them at [whaleresearch.com](http://whaleresearch.com).

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean:

- If you live in City of Auburn: Tag @auburnwa and include the hashtag #auburnwa
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## DAY 3

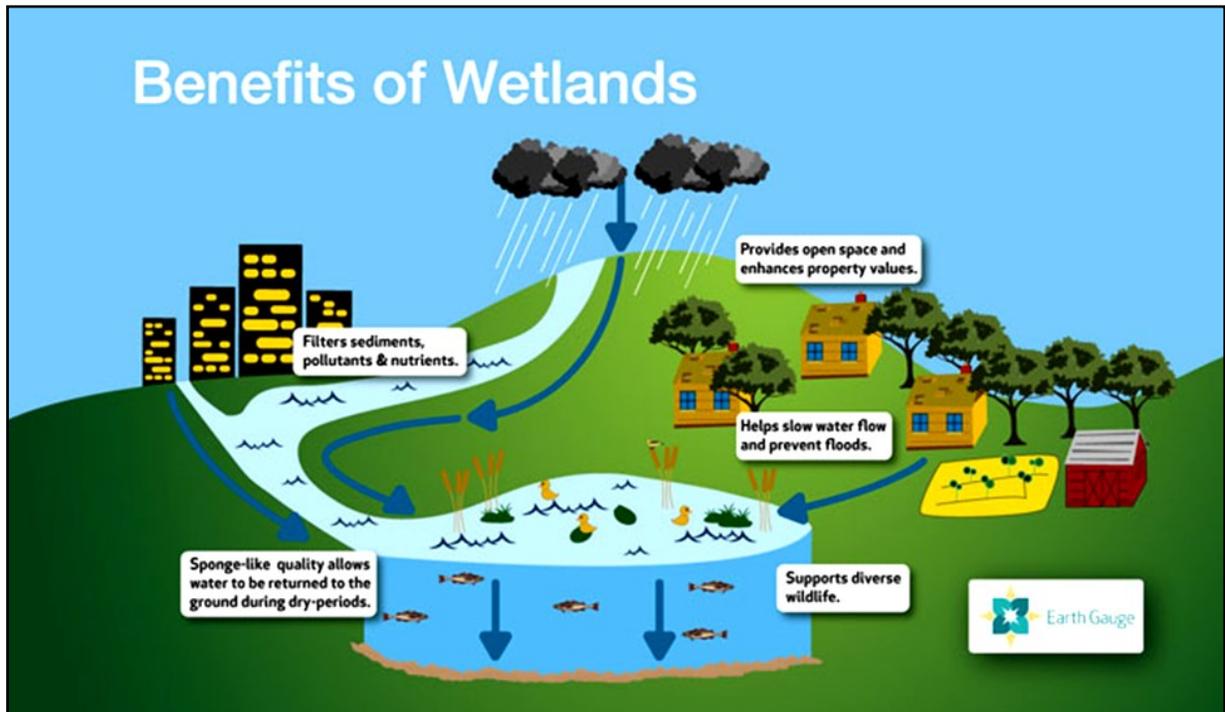
### Wetlands

While water flows through our environment, one of the most important areas it moves through is our **wetlands**. Wetlands are just what they sound like, land that is wet. Wetlands contain water, **saturated** soil, and water-tolerant plants. Places like swamps, bogs, and marshes are all wetlands because they are places where the land is saturated for at least part of the year. That means that a wetland a place where the land is soaked with water.

Wetlands are really important because they help to slow down how fast water moves through our environment. They are able to absorb a lot of water and they even help to clean that water as it makes its way through the watershed. This means that by the time this water reaches the nearest body of water, it is carrying less pollution! Wetlands are also very important habitat for many different animals, and so they help to support both natural and human communities.



For many years, people did not understand how important wetlands were and they did not treat them very carefully. We now know how important they are! We are trying our best to help make sure that wetlands can continue to clean and absorb our water so people and the environment are healthy. One thing that people are doing is creating areas called **bioswales**. Bioswales help to combine the actions of a storm drain and a wetland. They are basically ditches filled with plants that work to absorb stormwater. People build them along the side of roads and help direct water to them so stormwater has a chance to be slowed down, absorbed, and cleaned in a city, just like it would in a natural area.



Source: <https://www.motherearthnews.com/nature-and-environment/earth-gauge-tip-of-the-week--american-wetlands-month>

### **Vocabulary**

**Absorbed:** Soaked into the ground

**Bioswale:** Ditches designed to concentrate and move stormwater runoff while removing debris and pollution

**Contaminated:** Made dirty by pollution

**Diverse:** Having variety, many different kinds of species

**Saturated:** Areas that are soaked or filled with water

**Sediment:** Loose soil carried by water

**Wetlands:** Areas with water loving plants that are filled with water part of the year

# Main Activity

## Wetland Sponge Model

It might seem odd that a wetland is great at absorbing water, because it's already wet. It really is harder for dry land to absorb and clean water! You can use this simple scientific model to understand why this is true. Below are some instructions that will allow you to see the how a wetland absorbs more water than dry land by using two sponges, some water, and a tray or plastic container. Make sure that you have adult permission and are careful not to let the water from your experiment go down your drains at home! If you are doing this activity inside, it might be best to place your plastic containers in your bath tub or shower so if you spill water it won't make a mess.

**Materials:** Sponges, tray/plastic container, measuring cup, water, dirt or coffee grounds

1. Place one of your dry sponges in a container to represent hard, dry ground. Pour 1 cup of water that is clean representing uncontaminated rainwater over your dry sponge. Collect the water from your plastic container and measure it.
  - How much was absorbed?
2. Next, mix some water with a small amount of dirt and/or coffee grounds to represent sediment and pollution. Pour this over a dry sponge.
  - How much of the coffee grounds or dirt were collected?
3. Next, let's use these sponges we've gotten wet as our wet sponges, or the soil in our wetlands. We'll use these to observe how wetlands help manage water by holding it in the soil preventing flooding. The sponge with the dirt and/or coffee grounds is your polluted sponge, while the other is your clean sponge. Pour water over your clean sponge to model rain water soaking into the earth. As the sponge (representing soil) becomes more saturated, more water is slowly being absorbed by the sponge before collecting in the container below, modeling how water is absorbed by a wetland.
  - Measure the amount of water that your wet sponge collected. Where would they have gone if they were not collected by the sponge that represents our wetland? What do you think would've happened if you poured water over the polluted sponge?

4. It is important that we continue to allow water to be absorbed by the land, because when we do not, it can cause problems for people and animals. Now, pour water over the polluted sponge and answer these questions about what happens to water that enters polluted wetlands.

- *When we run the model using clean water and "contaminated" water, what do you notice?*

- *In what ways can we help minimize the amount of water (especially dirty, polluted water) that enters our environment?*

- *Why do you think this is important?*

- *What are some observations you can make about water that is allowed to soak in to the sponge? Is it cleaner? Is there the same amount?*

# Optional Activity

## Build Your Own Wetland Filter

In this activity, we will create a model to see how wetlands act as natural filters for the water in our watersheds.

**Materials:** Bucket or gallon jug, strainer/colander, coffee filter, large plastic container, small plastic container or yogurt cup, leaves, twigs, soil, litter, soy sauce, vegetable oil

### **Instructions:**

1. Fill a bucket 1/2 way with water or cut the top from a gallon jug to hold water. This represents your wetland.
2. Find leaves, twigs, soil, and litter to add to your water. If you aren't able to collect things from the outdoors, you can also use things from your home like small pieces of paper, plastic bread bag tabs, and other materials. **Do not add anything dangerous like band aids, tissues, or sharp things.**
3. When stormwater moves over the land, it brings many things with it like, leaves, sticks, dirt, and litter. Put everything you found into the bucket.
4. The bucket is a wetland. Use the spoon to mix the contents of the bucket. This is the water moving across the land. We'll start by looking at the natural process and then what happens with human influences.
5. Start by removing the largest pieces from the water using your hands. This acts like the leaves and branches of wetland plants that catch the biggest pieces of debris and litter while keeping them from entering other bodies of water.
6. Pour the dirty water into the strainer/colander. This is the root layer that catches the medium-sized chunks of debris, but the water is still dirty and needs more cleaning.
7. Take the water caught from the colander and pour it into the coffee filter with its tiny holes. This coffee filter represents the wetland filtering out sediments before the water travels to other bodies of water. Sediments trapped in the wetland prevent excess sediments from entering river and lake systems. Why would that be important? They can cover fish eggs and other bottom dwelling aquatic creatures. In reality, wetlands do a much better job than our simulation, but this shows how different types of filters can help clean the water.
8. Now we are going to do this again, this time with human influences. Put all the water and materials back into the bucket. Think about the following questions:
  - *How would pollution get into the wetlands? What kinds of human activities will influence the water quality of the wetland?*

9. The thick organic wetland soils can trap pollutants and keep them out of the adjacent water bodies. Sounds good right? However there is a drawback – accumulation of these pollutants can harm wildlife as they pass through the food chain. Next, simulate what happens when pollution like petroleum oil (i.e. gasoline or motor oil) enters the water. In this experiment, we are using soy sauce and vegetable oil because these are types of oil that are made out of plants and if poured onto the grass will get broken down by other plants.
- *What do you notice about how the filters were able to clean the “natural” water, and the water after it had oil and soy sauce in it?*

## Optional Activity

### Stormwater Stewardship Challenge for Day 3

People can have a very big impact on nature, sometimes in good ways and sometimes in bad ways! Today we will think about how items around the house might end up affecting other parts of nature, especially the salmon swimming in our rivers.

**Materials:** Writing utensil, computer/phone/tablet, internet connection

For today's stormwater challenge, look around your home and try to find anything that could harm salmon if it somehow ends up in the river. Think about any items that might wash away with stormwater when it rains.

Write down anything you found that could harm salmon, along with what you can do to help keep salmon safe.

For example:

Plastic bottle – Throw it in the recycling bin

1.

2.

3.

4.

5.

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean:

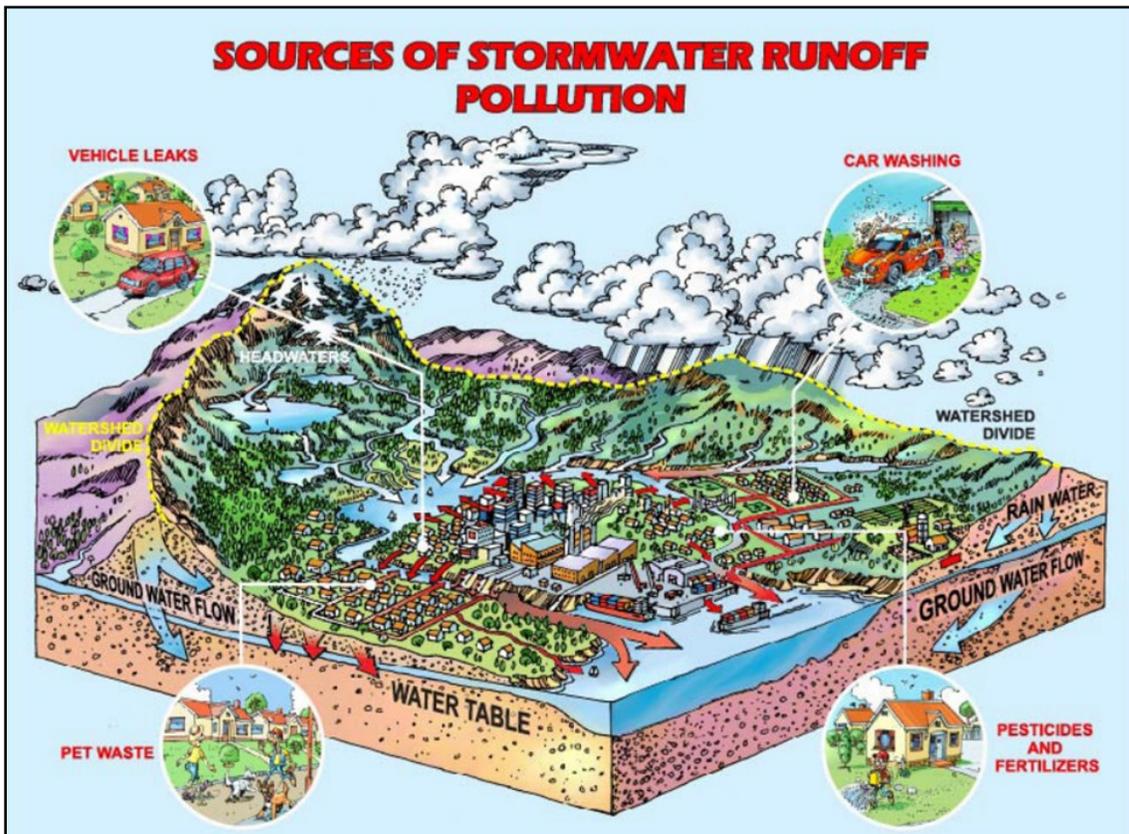
- If you live in City of Auburn: Tag @auburnwa and include the hashtag #auburnwa
- If you live in City of Bothell: Tag @BothellWaUSA and include the hashtag #PugetSoundStartsHere
- If you live in City of Lynnwood: Tag @LynnwoodWA and include the hashtag #Lynnwood
- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd

# DAY 4

## Puget Sound and Marine Ecosystems

The Puget Sound is one of the biggest **estuaries** in the world. It covers over 2,500 square miles! Also, over 4 million people live in the Puget Sound area along with more than 200 kinds of fish, 100 sea bird species, and 13 marine mammals, like whales and otters. Unfortunately, between 52,000 and 66,000 pounds of **pollutants** are released into this **ecosystem** every day. The majority of that pollution comes from our homes and neighborhoods.

This pollution has been found in every living thing in the Sound. People and organizations in the area have created major projects to start fixing this pollution problem because many living things are being hurt or even dying every day because of the pollution.



### Vocabulary

**Estuaries:** The tidal mouth of a large river, where the tide meets the stream

**Ecosystem:** A community of interacting organisms and their physical environment

**Pollutants:** A substance that pollutes something, especially water or the atmosphere

**Outfall:** Discharge point of a waste stream into a body of water

# Main Activity

## Who Polluted Puget Sound?

Read the following story. Keep in mind everything that you've learned about pollution and stormwater up to this point! As you read, underline the things that could be a cause of pollution and draw a story map of where your character saw each different problem (home, school, roads, lake, etc.) on the space under the story. When you've read the whole thing, answer the questions that follow.

**Bonus:** Create your own comic book by drawing this story!

**Materials:** Writing utensil, drawing utensils (optional)

### Who Polluted the Puget Sound?

*In this story, imagine that it is a rainy day outside and even though it is cold and wet, you need to get ready for school and take your dog for a walk. Unfortunately, you slept in and are now running late so you are in a hurry. You grab the leash and rush out the door with your dog. As you walk down the block, your dog poops near the curb. You see a small branch nearby and use it to poke the poop into a storm drain since you're in a hurry. As you walk quickly back home, you wave to a neighbor who is fertilizing their lawn. It spreads across the lawn but also gets on the sidewalk and street.*

*You run into the house, put the dog out and head to the kitchen. Your adult is unhappy that you're late but has packed you a lunch and grabs the last can of soda from the pantry and throws it into the bag. They toss the six pack rings in the garbage and rush you out the door. You jump in the car and pull out, noticing a little shiny spot on the driveway where the car was parked. There must be a small leak and your adult grumbles about needing to get it fixed.*

*Staring out the window as you drive you notice the normal garbage along the road. Plastic and foam pieces have been run over so many times that they're just little chunks now. As you pull in, you see the school custodian dumping a mop bucket out in the gravel and you wave as you run inside.*

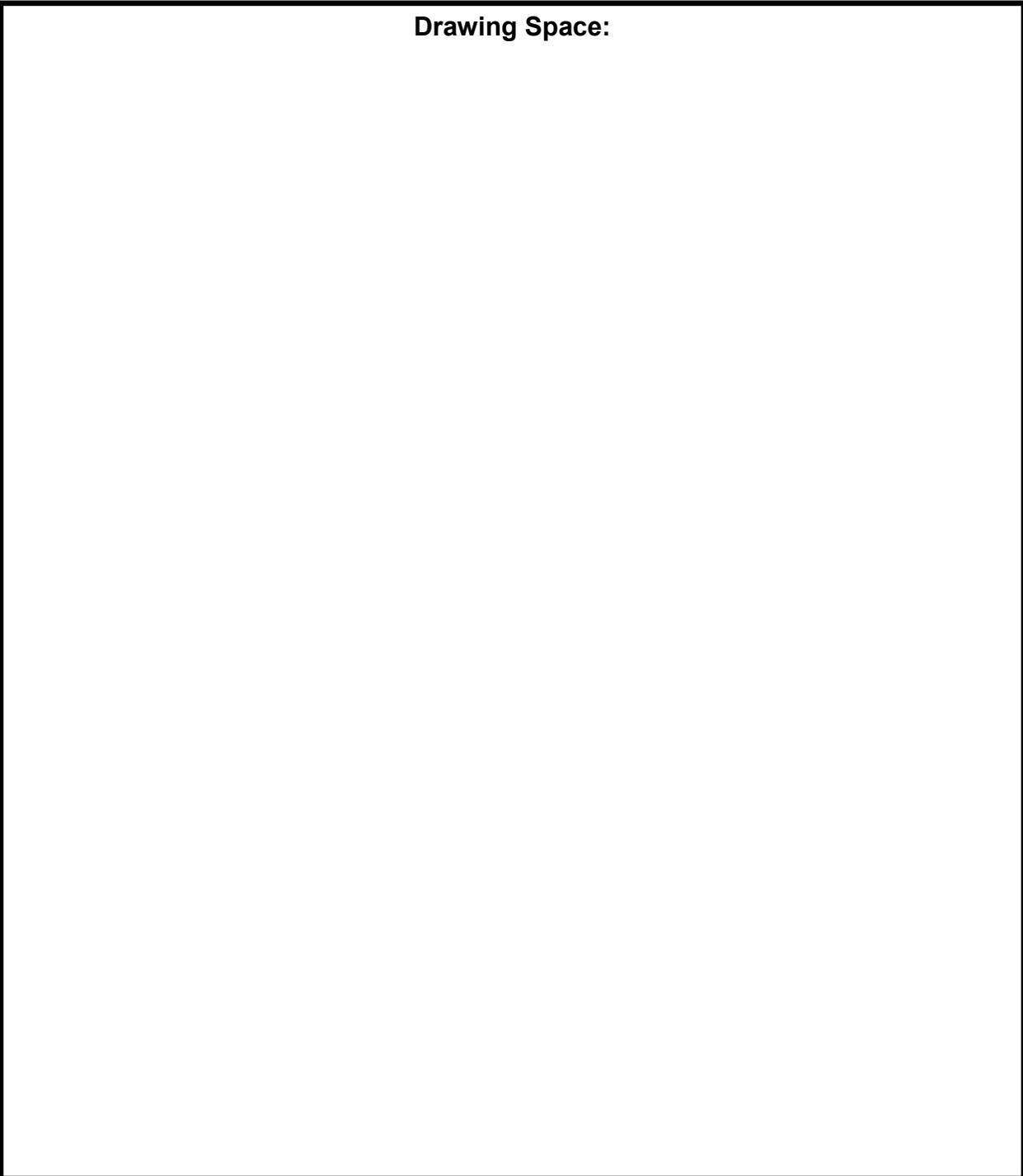
*It's a great day in class because you're doing some arts and crafts. You paint a pretty great picture of your dog and make a fine mess while doing it. Art is messy! The teacher looks concerned as they pick up the supplies and decides to dump out the leftover paints, glue and other materials outside so it doesn't clog the sink in your classroom. They dump it into a storm drain and rinse everything down with a pitcher of water so there isn't any more mess.*

*After a long day in class, you're excited to get home and share your art. Your adult picks you up and you tell them about your day while driving home. You pass a lake with boats speeding around and once again notice some pieces of litter floating by the shore and along the road. Your adult was busy today. They washed the car and painted a bookshelf... you can still see suds and bits of paint on the driveway. They also worked in the garden laying out slug bait to try to kill the pests that have been eating the vegetables.*

*It has started to rain so you run inside where your family is cleaning up and getting ready for dinner. The news is on and you hear that the rain has caused a mudslide near the lake that has blocked the road and pushed a bunch of soil into the water. A sewer truck was parked nearby and got tipped over as well and there is a huge mess that crews are trying to clean up. You're glad you got home before the road closed.*

*After dinner you help clean up, get your homework done and still have a little time to read before heading to bed. It's been a full day and tomorrow will be another one.*

**Drawing Space:**



**Questions:**

*How many different sources of pollution can you find within the story?*

*Using what you've already learned this week, what things in the story will eventually end up polluting the Puget Sound?*

*How will they get there?*

*What are some ways that some of this pollution could be prevented?*

# Optional Activity

## Video

**Please ask for an adult's permission before watching this video.**

**Underwater Footage:** As we've discussed, all storm drains eventually lead to the Puget Sound. The pipes that empty all of the stormwater runoff into the ocean are called outfalls. Have an adult help you to watch this video of one of these outflows while it is raining on Seattle. This video can be found by doing a YouTube search for "Underwater Footage: Seattle storm drains emptying into Puget Sound", or by clicking the following link:  
<https://www.youtube.com/watch?v=omUuWxP8YFU>

**Materials:** Computer/phone/tablet, internet access, writing utensil

### Questions:

*What are some of the kinds of pollution that you think are coming out of this pipe?*

*How was this similar or different from what you imagined it would look like?*

## Optional Activity

### Stormwater Stewardship Challenge for Day 4

One of the most important parts of how we deal with stormwater is our system of storm drains. When they work right, these drains help to prevent flooding, direct pollution away from our freshwater lakes and streams, and prevent damage to our homes and community.

**Materials:** Waterproof or protective gloves for your hands, trash bags, computer/phone/tablet, internet connection

To help your community keep storm drains working well, you can volunteer to adopt a storm drain!

You don't need to volunteer officially to do your part though! Anyone can help to keep a drain near them clear of leaves, sticks and other things that could clog the drain.

**With an adult**, find a storm drain near your home and remove any debris that might be clogging up the drain opening! Use a broom to sweep away any leaves, sticks, or small rocks on top of drain.

#### Important things to remember:

- **Never use your bare hands to pick up anything.**
- **Never pick up anything sharp or dangerous**
- **Do not go into the street.**
- **Be careful when walking and always watch out for cars, bikes, and other traffic.**
- **Whenever you are outside it is important to be safe, responsible and respectful.**

If you aren't able to make it outside, you can still help! Make a poster reminding people to keep storm drains clear and how to do it safely that you can display in a window, photograph and send to friends and family or post on social media.

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean:

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# DAY 5

## Stewardship

**Stewardship** is how we care for the natural world. It includes conservation of the natural resources like water that all living things need to survive, thinking and acting carefully about how we interact with the world around us, and doing our best to make sure that we have a positive impact on the environment. When we talk about stewardship in this packet, we are focusing on what everyone can do to save water and keep it clean for the rest of the environment.

75% of all pollution in the Puget Sound starts in our neighborhoods. This means that even though there is a lot to be done everywhere else to protect our water from pollution, a big part of solving this problem starts at our homes.

First, we should understand how much stormwater we get in our neighborhoods. If one inch of rain falls on an acre of land (a bit more than half of a soccer field), it adds up to more than 27,000 gallons of water! This weighs over 100 tons! That is a huge amount of water moving through a small space. Now, imagine how big our neighborhoods and our region both are! When we think about how our area gets more than 40 inches of rain each year, it's easy to see why so much pollution gets washed into storm drains and out into our rivers, streams, and eventually Puget Sound.

Fortunately, there are a lot of little things we can do at home and in our neighborhoods to help out. These include picking up our pet's waste, using compost rather than other fertilizers, or going to commercial car washes instead of washing your car at home. Parts of Seattle reduced their stormwater runoff by 97% in a year by making some of these changes and by doing the same ourselves we can have a real impact!



### **Vocabulary**

**Audit:** A detailed inspection

**Stewardship:** Taking care of something; being a protector

# Main Activity

## Eco Audit

Now that we know some ways that we can help prevent pollution from stormwater runoff, let's see what can be done around our home or in our neighborhood. An **audit** is when someone takes a close look at something and measures what is going well and what can be improved. Today, you're going to take a look around your home and using what you've learned, complete an audit to see what you are doing well and where you can improve.

**Materials:** Writing utensil

Start looking around your home for things you're doing well and things you can improve on. If you're able to go outside and look around, make sure that you have an adult help you and that you are safe, responsible and respectful. If you're not able to go outside you can still look out the window or just use your memory to do this part. To figure out what to look for, answer the following questions, then complete the audit chart on the next page:

*Where does the water from your roof go? Is it collected in a rain barrel? Is there a place for that water to be absorbed by the earth? Does it go directly into the street?*

*Are there trees, bushes, or green space near your home to slow down and absorb water?*

*Are the streets and sidewalks near your home clean of litter?*

Use the following chart to make a list of all the ways that pollution could start around your home and make its way into the water. Then, either list what you and your family have done to help prevent that, or come up with a recommendation for what you could do to help. Remember to look closely and if you need help, take a look at the rest of this packet for ideas. Once you've finished your audit, share it with some of the people in your home!

### Pollution

### Prevention

## Optional Activity

### Caring for Your Neighborhood Stormwater

We want to make sure that the water entering our storm drains is as clean as possible and that storm drains do their job of preventing flooding in our streets. There are a few things you can do around your home and in your neighborhood that help keep this water clean!

**Materials:** (Miscellaneous optional materials) writing utensil, computer/phone/tablet, internet connection, gardening supplies, tree or plants

Below are a few stewardship ideas and online resources that can help you learn more about caring for your neighborhood stormwater. Try one or all of them out!

1. One simple thing you can do is taking some time to make sure that the area near your home is clean and litter free. Simply picking up some of the trash you find makes sure it goes in a landfill instead of our water. You can also clear the debris from the drains if there are lots of leaves or large sticks. This will help prevent floods in your neighborhood and keep our storm drains working properly.
2. Another thing you can do is help make sure that the plants near your home are healthy, or if possible, planting some of your own.
3. The plants that grow normally in our area are great at filtering out pollution and holding back stormwater so that it doesn't rush straight out to the Sound. One of the best ways to support pollution prevention is to plant a tree! The needles of evergreen trees in Washington's forests can hold as much as 40% of the rain from a light rainfall. On top of that, they provide homes for many other creatures, help hold the soil together and fertilize the ground around them. Trees also filter out pollution from the air and help to keep the environment at a healthy temperature.
4. Check out the organization Trees for Neighborhoods at their website: <https://www.seattle.gov/trees/planting-and-care/trees-for-neighborhoods>. This is an organization that has helped to plant over 10,000 trees in the area. With an adult's help, visit the webpage and decide if you have a place that would be a perfect spot to plant a tree. If you have a spot, you can fill out the application and members of your community will come out and help you to plant a tree and care for it so that it will help the environment for years to come!

## Optional Activity

### Stormwater Stewardship Challenge for Day 5

There are so many ways to protect and care for our water. At the end of every daily lesson, we will be giving a stormwater challenge to help you show off what you've learned.

**Materials:** (Optional) writing utensil, crayons/markers/colored pencils, computer/phone/tablet, internet connection

Using what you've learned this week on stormwater pollution, it's time to make your own Stormwater Challenge! Think about all of the things we learned this week. What new thing can you do to share what you know or new ways you've learned to keep our waterways clean?

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean:

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