TEACHER OVERVIEW

Human Systems

Kindergarten — 2nd 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
- 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

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.

This packet introduces the difference between stormwater and wastewater and how they drain to different places. Students discuss what permeable and impermeable surfaces are. Next, they learn more about wastewater and how it is cleaned at the wastewater treatment plant. The week will end with activities on stewardship and green infrastructure.

If you have any further questions or concerns regarding this packet, please email our Office Coordinator at info@naturevision.org.

Grades K-2

Supports NGSS Performance Expectations: K-ESS2-2, K-ESS3-3, 2-ESS2-1, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3.

Grades K-2
Day 1 - Stormwater vs. Wastewater
Day 2 - Cities and Forests
Day 3 - What is Wastewater?
Day 4 - What Happens to Wastewater?
Day 5 - Green Projects

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

PARENT/CAREGIVER OVERVIEW

Human Systems

Kindergarten — 2nd 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
- 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

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
- King County Flood Control District: Tag @KingCountyDNRP
- King County Wastewater Treatment Division: Tag @kingcountywtd

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/.

Please contact info@naturevision.org with any questions or concerns
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NOTE: Students may require support in reading directions and/or completing some tasks. While many activities in this packet are creatively oriented and open ended, you may consult the answer key located at the back of the packet for additional assistance or guidance.

Unless otherwise noted, images courtesy of freepik.com

PARENT/CAREGIVER OVERVIEW: DAY 1

Stormwater vs. Wastewater

Background Information: Stormwater and wastewater play an important role in the health of our environment. When rainstorms bring excess rain to our area, storm drains remove the extra water and send it to wetlands, stormwater retention ponds, or straight into a body of water. This water is not cleaned or treated, unlike wastewater. Wastewater is what we call the used water that comes from the buildings we live and work in. This includes the water from sinks, showers, tubs, toilets, washing machines, dishwashers, and more. Water that goes through the wastewater system is directed to the wastewater treatment plant. After it arrives, it is cleaned, filtered, and released back into Puget Sound. Because storm drains do not undergo this treatment, it's important to make sure that only rain goes down the storm drain. Pollution or other materials on our roads and sidewalks can enter our waterways through storm drains and affect the health of the plants and animals that live there.

Learning Objectives: Students will learn the difference between stormwater and wastewater, what happens to wastewater after it goes down the drain, and what items should never go down the wastewater drain. Students will model the effect of fats, oils, and grease (FOG) on the wastewater pipes and show what happens to the water flow in the event of a wastewater blockage.

Main Activity: Clogged Pipes

- ***Overview****:* Students simulate the effects of fats, oils, and grease (FOG) on a wastewater pipe using materials found around the home
- ***Parent/Caregiver Tasks****:* Provide supervision and help gathering materials

Optional Activity: Wastewater Maze

- ***Overview****:* Students complete a maze from a drain inside the house to the wastewater treatment plant while adding in wastewater blockages to show how it affects the flow of water
- ***Parent/Caregiver Tasks****:* None

Optional Activity: Stormwater Stewardship Challenge

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

PARENT/CAREGIVER OVERVIEW: DAY 2

Cities and Forests

Background Information: Human-made objects have a significant impact on the flow and movement of water through different environments. In a natural area like a forest, the soil is permeable and therefore able to absorb water as it falls and flows. In cities and other paved areas, the ground is usually impermeable and water instead flows over the surface. This can result in flooding as well as the spreading of pollution.

Learning Objectives: Students will understand the difference between permeable and impermeable surfaces, finding examples of each in both developed and natural areas. They will learn how these surfaces affect the movement of stormwater and potentially pollution as well.

Main Activity: Flowing Water

- ***Overview****:* Students create a model showing permeable and impermeable surfaces side-by-side, use water and common kitchen ingredients to simulate pollution, and observe how each moves differently in cities and forests
- ***Parent/Caregiver Tasks****:* Assist with gathering materials and setting up experiment

Optional Activity: Mapping the Landscape

- ***Overview****:* Students create a map that shows all of the permeable and impermeable surfaces in an area
- ***Parent/Caregiver Tasks****:* Provide supervision if exploring outside

Optional Activity: Stormwater Stewardship Challenge

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

PARENT/CAREGIVER OVERVIEW: DAY 3

What is Wastewater?

Background Information: Wastewater is the product of used water in our homes and other buildings. Water used for showering, bathing, flushing the toilet, doing laundry, washing dishes, and using a faucet becomes wastewater once the water flows down the drain. Wastewater is mainly water, but it also contains a small percentage of nutrients from human waste, FOG (i.e. fats, oils, and grease), bacteria, viruses, and other chemicals found in household products. In our region, all wastewater is sent to a wastewater treatment plant to be treated and disinfected before being released into Puget Sound.

Learning Objectives: Students will understand what daily habits and appliance use results in creating wastewater. They will be able to identify wastewater components and also what should not be found in wastewater. Students will discover the household items that are damaging to the wastewater systems and learn to refrain from flushing certain items down the toilets and drains.

Main Activity: The Four P's

- ***Overview****:* Students identify the specific items that are allowed to be flushed down a toilet, and other common household items that are not safe to be flushed down a toilet
- ***Parent/Caregiver Tasks****:* None

Optional Activity: Wastewater Scavenger Hunt

- ***Overview****:* Students find their own household appliances that use water and release wastewater afterwards
- ***Parent/Caregiver Tasks****:* None

Optional Activity: Stormwater Stewardship Challenge

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

PARENT/CAREGIVER OVERVIEW: DAY 4

What Happens to Wastewater?

Background Information: Wastewater flows to five treatment plants in King County. Wastewater is sent through a series of processes that require a primary, secondary, and disinfection treatment. The primary treatment moves the wastewater slowly through sedimentation tanks. This step gives the heavier solids the time to sink to the bottom of the tank and allows for separation from the liquid. The solid is scooped out and the liquids move on to secondary treatment. Oxygen is then added to stimulate the living microorganisms that will eat the remaining organic material in the wastewater. The final treatment is disinfection of the wastewater and release into Puget Sound.

Learning Objectives: Students will learn the basic and necessary steps for wastewater treatment in King County. Students will discover that wastewater is returned into the natural environment, Puget Sound, and therefore it is important that we ensure its careful treatment.

Main Activity: Wastewater Treatment Plant Puzzle

- ***Overview****:* Students create a wastewater treatment plant puzzle by putting together the puzzle pieces in order of the treatment process steps
- ***Parent/Caregiver Tasks****:* Help with cutting the puzzle pieces or drawing the puzzle pieces if printing is not an option

Optional Activity: Wastewater Treatment Model

- ***Overview****:* Students make a model of the primary wastewater treatment step
- ***Parent/Caregiver Tasks****:* Provide supervision, permission, and help with acquiring materials and finding an appropriate space

Optional Activity: Stormwater Stewardship Challenge

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

PARENT/CAREGIVER OVERVIEW: DAY 5

Green Projects

Background Information: Stewardship means taking care of something or being a protector. In the case of stormwater, there are many projects and ideas that people can build to help handle issues that arise. We can use rain barrels to collect water, install green roofs and rain gardens to absorb and slow down flowing water, or even create permeable pavement that allows water to pass through it. These are just a few of the ideas that people have come up with to help control the flow of stormwater and pollution through our cities and towns.

Learning Objectives: Students will be able to identify some of the most common stormwater projects. They will understand what services these projects provide and will be able to spot them in their own neighborhoods.

Main Activity: Helping the Town

- ***Overview****:* Students examine an image of a neighborhood that is experiencing issues due to stormwater, identifying areas that can be improved by one of the many stormwater projects discussed in the packet's lessons
- ***Parent/Caregiver Tasks****:* None

Optional Activity: Stormwater Coloring Sheet

- ***Overview****:* Students complete a coloring sheet showing how rain barrels and rain gardens are beneficial to your home
- ***Parent/Caregiver Tasks****:* None

Optional Activity: Stormwater Stewardship Challenge

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

PARENT/CAREGIVER OVERVIEW: VOCABULARY

DAY 1
Biofuel: Fuel made from plants, algae, or animal waste
FOG: Fats, oils, and grease that can clog the wastewater pipes
Stormwater: Excess water from rainstorms that enters a storm drain

DAY 2
Habitat: The home of a plant or animal
Impermeable: A word that describes anything that does not let water pass through it
Permeable: A word that describes anything that lets water pass through it
Pollution: Unnatural contaminants introduced to the natural environment

DAY 3
Wastewater: The water that has been used in homes, businesses, or buildings

DAY 4
Disinfection: The process of cleaning something to destroy bacteria
Wastewater Treatment Plant: A facility where wastewater is sent to be treated and cleaned

DAY 5
Green roof: A garden or lawn that is planted on a rooftop
Permeable pavement: Pavement that is designed to let water pass through it
Rain barrel: A large container used to collect rainwater
Rain garden: A specially designed garden that helps soak up stormwater and prevent flooding
Stewardship: Taking care of something, being a protector

DAY 1

Stormwater vs. Wastewater

Everything on our planet relies on water! We've learned all about where our water comes from and how it affects the environment, but what happens to water when it gets dirty? We know that streets have storm drains to take the extra rainwater away. We also know our homes have drains in the sink and tubs, but where does *that* water go? These drains take water away to different places than our storm drains. Knowing the difference between these drains is important for making sure water goes to the correct place.

Outside your home, the drains you see on the street are called storm drains. They help collect extra **stormwater** from rainstorms and send it away from the street so it doesn't cause flooding on the street. Storm drains empty out into wetlands, ponds, streams, lakes, rivers, or the ocean. If there is pollution on the street, that pollution goes straight into our waterways without being cleaned! That's why it's important to remember that only rain goes down the storm drain.

Inside your home, you will find drains anywhere where there is water: sinks, showers, washing machines, dishwashers, toilets, and tubs. These drains take the dirty, used water, called wastewater, and send it through a system of pipes that go to a wastewater treatment plant. There, the water is cleaned and sent back into nature to become part of the water cycle again. We'll learn more about this on Day 3 and Day 4!

There are three things you should *never* put down your drain. These are fats, oils, and grease, which together are called "**FOG.**" Some examples are butter, oil, milk, cream, mayonnaise, sauces, and soups. When poured down the drain, these fats, oils, and grease will harden and cause major clogs in the pipes, which may lead to wastewater back-ups and flooding! Hot water and drain cleaning products only push the clog further down the pipes, making the problem worse!

To protect your pipes, here's what you can do:

- Scrape and wipe first.
    - Use a paper towel or a utensil to scrape off any leftover food into your compost or trash.
- Avoid using the garbage disposal for food scraps.
    - Only very small bits of food should ever enter the garbage disposal, make sure that oily, greasy foods stay out!
- Pour left over oil or grease into a container and dispose of it that way. Some companies will even collect your oil and turn it into **biofuel**!

We can all do our part to protect our water by making sure that only rain goes down the storm drain. This means never putting soap, paint, oil, or anything else down the storm drain. From inside our homes, we can prevent clogs and keep our wastewater treatment plants working by keeping FOG, food scraps, and other items out of the drain!

Vocabulary

Biofuel: Fuel made from plants, algae, or animal waste
FOG: Fats, oils, and grease that can clog the wastewater pipes
Stormwater: Excess water from rainstorms that enters a storm drain

Main Activity

Clogged Pipes

FOG can cause a lot of harm to our wastewater pipes. Most grease fats are liquid or watery when hot, but turn into hard solids when cooled down. When FOG is poured into pipes, it builds up and becomes hard, like cement. Eventually, this can block the path of the wastewater. This means the clogged wastewater pipe can break or go back the other way inside your home!

The reason FOG is bad for your pipes is because water does not mix well with the fats, oils, and grease in it. Using dish soap will work on very small amounts on FOG. For large amounts of FOG it's best to dispose of it in the compost or trash.

Materials: Writing utensil, cardboard tube from paper towel/toilet paper, a sticky substance (nut butter, vegetable shortening, mayonnaise), paper towel (tissues or toilet paper also work)

Ask an adult first before finding materials and for a good space to do this activity. DO NOT EAT ANYTHING!

We will now create an example of how FOG can affect our wastewater pipes. Your cardboard tube will act as your 'pipe' and the sticky substance will be the FOG sticking to the sides. Follow the steps below to see how the build-up of FOG in your pipes can affect the flow of water.

Step 1: Turn the faucet on and hold your 'pipe' underneath so that water can flow through.

Is it easy for the water to go through your 'pipe'? _____

Step 2: Smear some of your sticky substance inside the cardboard tube. This is the effect that FOG has on your pipes! Notice how it sticks to the sides and makes the space smaller for the water to flow through.

Draw a picture of what your pipe looks like right now.

Step 3: Now, take your flexible material (paper towel, tissue, or toilet paper) and stuff it inside your tube, noticing how it gets stuck in the FOG. This is showing how FOG builds up over time in your pipes, eventually filling the whole space! Once you've stuffed it, hold your "pipe" underneath a faucet and turn it on.

Draw a picture of what your pipe looks like fully 'clogged'.

Is it easy for the water to go through your 'pipe'? _____

When you're done, you may choose to throw the cardboard tube in your compost or trash.

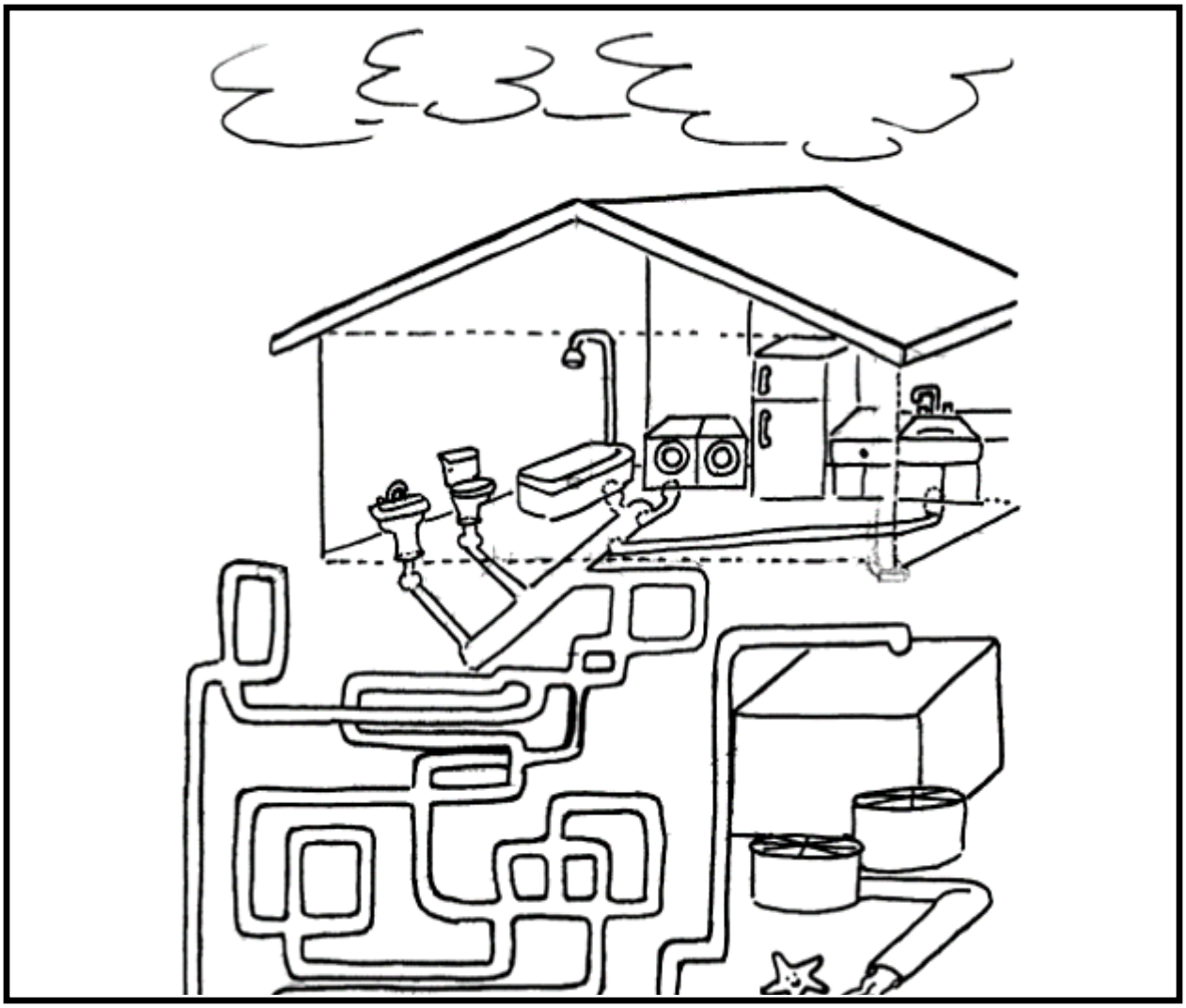
Optional Activity

Wastewater Maze

When the wrong items go down our wastewater pipes, they can cause clogs. These clogs prevent the wastewater from reaching the wastewater treatment plant, which causes flooding in our homes and buildings!

Materials: Writing utensil, eraser

On the maze below, mark an X over 3 spots. This will represent Fats, Oils, and Grease (FOG) in our pipes. Then complete the maze starting from one of the inside drains. If you reach one of your X's, you must turn around and find another way. If you are unable to reach the wastewater treatment plant, uh oh! You have a wastewater back-up. You may erase your lines and try again! Once you've completed the activity, answer the questions below to show what you've learned!



Did you have a wastewater back-up? _____

What did you learn from the maze?

_____

_____

_____

_____

Show what you learned! Answer the questions below:

1. Used water from our homes is called_____

2. True or False: You can dump fats, oils, and grease down the drain _____

3. Extra water from rainstorms is called_____

4. True or False: Stormwater and wastewater go to different places_____

5. List 3 things that should never go down your wastewater drain:

    1._____

    2._____

    3._____

Optional Activity

Stormwater Stewardship Challenge for Day 1

Stormwater pollution is a problem that can be solved by anyone living in our cities. Our friends, family, neighbors, teacher, classmates, and everyone else can be part of the solution with us. Today you learned about the pollution problem and that smart decisions can make a big difference. Finding people who want to learn about pollution, are interested in helping, or ready to help with a problem can be the first step to the solution!

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

With an adult, make a list of three people you know that can be part of the stormwater pollution solution! One person can be someone you think needs to learn about storm drains and the pollution problem. The second person can be someone you think would help you with solution ideas. The third person can be someone who will help you find more information. Write the names of these people you know in the boxes on the next page. Mark **yes** or **no** if they can be called, emailed, or texted.

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

People You Know!	Name	*Can you call this person with an adult?*	*Can you email this person with an adult?*	*Can you text this person with an adult?*
1. Someone who needs to learn about the stormwater pollution problem. *Maybe a friend, sister, brother, cousin, or neighbor?*				
2. Someone who will help you think of solution ideas. *Maybe a friend, adult family member, or school teacher?*				
3. Someone who will help you find more information. *Maybe a sister, brother, cousin, adult family member, school teacher, or librarian?*				

DAY 2

Cities and Forests

Today we will explore two important and special areas that we find all around us:

Cities…

…and Forests!

Cities and forests are obviously very different places. There are different sights, sounds, smells, and more…there are even different kinds of plants and animals in each location! One of the biggest differences between the two, however, is how each one handles the water that flows through it.

In the forest, the ground is mostly made up of soil. Not only is all of that soil an important **habitat**, or home, for all kinds of living things, but it also helps control the movement of water in nature! When soil is able to do its job, it soaks up water like a soft sponge. This helps to prevent flooding by slowing water down, as well as stopping harmful things like **pollution** from spreading by soaking up dirty stormwater.

The city, on the other hand, is covered by another kind of surface. While you can still find spots with soil or plants in your city or town, most of the ground has been covered up with roads, sidewalks, or parking lots.

When water lands on these surfaces, it cannot soak down into the ground like it could in the forest. Instead, the water pools and forms puddles, eventually flowing along the sides of the road until they empty out into storm drains. This happens because the pavement we use to build our roads and sidewalks is **impermeable**, meaning it does not let anything pass through it. Soil is the opposite; it is **permeable** and allows water to move slowly through it. Here are some other common items that are either permeable or impermeable:

Permeable	Impermeable
Sponges 	 Glass
 Paper Towels	Rocks 
Clothes & Fabric 	 Plastic

Vocabulary
Habitat: The home of a plant or animal
Impermeable: A word that describes anything that does not let water pass through it
Permeable: A word that describes anything that lets water pass through it
Pollution: Unnatural contaminants introduced to the natural environment

Main Activity

Flowing Water

You just learned about how water flows differently through cities and forests. The objects that people build and the surfaces that we put down can change the movement of water in lots of ways. Let's test out some common items from around the house to help us understand exactly what happens when water flows over them!

Materials: Cookie sheet, baking dish, or sheet pan, paper towels, tin foil/wax paper/parchment paper, spray bottle, tape, cocoa powder/drink mix (optional), writing utensil

In this experiment, you will test how water flows over different kinds of surfaces. Using common household items, you can understand the way water moves and even how pollution can spread throughout nature.

Make sure to do this activity somewhere that it is OK to get wet. ***If you have adult permission and supervision***, you could even set this up outside and simply pour out your extra water on the grass or soil.

Follow the instructions on the next page to complete the experiment!

- Find a cookie sheet, baking dish, sheet pan, or any large plastic container. This will be the base for your experiment.

- Take a single paper towel and tape it to one end of the container. This will represent the forest, with its permeable soil.

- Take a sheet of tin foil, wax paper, or parchment paper and tape it to the other end of the container, so that it is side-by-side with the paper towel. This will represent a city, with its impermeable paved roads.

- Place a bowl or similarly sized object under one end of the container so that is slanted like a hill.
    - Only use items that can get wet without making a mess!

- Using your spray bottle full of water, slowly start to spray each surface. Pay attention to how the water moves!
    - If you do not have a spray bottle, fill a bowl with water, dip your fingers in, and splash the water off your fingertips and onto your experiment

What happened to the water on each side of your experiment? How far did the water move? How fast or how slow did it travel? Draw a picture of what happened, or describe it in the space below.

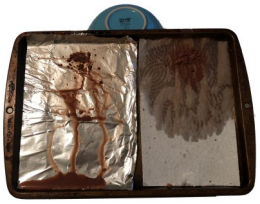
BONUS ROUND: Pollution on the Ground

- We are going to do this experiment again, but this time we will add something to represent pollution! Make sure to dry off and replace your permeable and impermeable surfaces. You will want a new paper towel for this second round.

- Choose what you will use to represent pollution. Some common ingredients that work well are:
    - Cocoa powder: This chocolate powder will turn your water to a dark brown color.
    - Powdered drink mix: This might come in many different flavors and colors, but any of them will work well for this experiment.

- Place 1 spoonful of your 'pollution' powder at the top of each side of your experiment. That means 1 spoonful on the top of the city side, and 1 spoonful on the top of the forest side.

- Using your spray bottle full of water, slowly start to spray each surface. Pay attention to how the water and the pollution moves!
    - If you do not have a spray bottle, fill a bowl with water, dip your fingers in, and splash the water off your fingertips and onto your experiment.



What happened to the pollution in the water on each side of your experiment? How far did the water carry the pollution? How fast or how slow did it travel? Draw a picture of what happened, or describe it in the space below.

Optional Activity

Mapping the Landscape

If you want to understand how water flows and where it goes in your neighborhood, it is important to know what kind of surfaces you have around your own home! With the help of an adult, you can make a map of your home, neighborhood, or even a nearby park.

Materials: Writing utensil, colored pencils/markers/crayons (red and blue), water (optional)

IMPORTANT! Only go outside if you have an adult with you! Make sure to be safe, responsible, and respectful at all times.

With an adult, you can explore an area near or around your home and figure out the kind of surfaces that are all around you.

In the space on the next page, draw a map of the area you choose to explore. Then, use different colors to show whether the ground is permeable or impermeable. Before you go outside, make sure you have an adult with you and bring a bottle of water if you have one!

- Use a **red** pencil, marker, or crayon to color in any parts of your map that are ***impermeable***. This will likely include roads, sidewalks, curbs, or any other place that you don't think water can pass through.
- Use a **blue** pencil, marker, or crayon to color in any parts of your map that are ***permeable***. This will likely include grassy spots, soil, or any other place that you think water could soak into.

If you are having trouble figuring out what kind of surface you are looking at, you can do a quick experiment to find out! Simply pour a small amount of water onto the ground.

- If the water disappears, then the ground is permeable. Color it **blue** on your map!
- If the water sits on top of the ground, then you have found an impermeable surface. Color it **red** on your map!

If you do not have any water to pour, sometimes you can figure it out just by using your feet! Step on the ground:

- If the ground is soft and squishy, then it is probably permeable. Color it **blue** on your map!
- If the ground is solid and hard, then it is probably impermeable. Color it **red** on your map!

Draw Your Map Here:

BLUE = IMPERMEABLE SURFACE

RED = PERMEABLE SURFACE

Optional Activity

Stormwater Stewardship Challenge for Day 2

Some of the most famous environmental heroes wrote poetry as a way of sharing their love for nature. Through their art they were able to influence many people and help pass laws that protect our environment even now!

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

Poems are short, creative writing that make you feel or imagine in a certain way. A lot of times they rhyme, but they don't have to. Poems don't have to make a lot of sense. The writer sometimes puts odd words together because they help you to imagine or feel something.

Here are two examples of poems:

There are holes in the sky
Where the rain gets in,
But they're ever so small,
That's why rain is thin.
-Spike Milligan

I'm glad the sky is painted blue,
And the earth is painted green,
With such a lot of nice fresh air
All sandwiched in between.
-Anonymous

Write a short poem below to help inspire the people you share it with to care more about stormwater and its effect on pollution and our environment.

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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- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd

DAY 3

What is Wastewater?

We use water in many ways at home and school. For cooking, toilet flushing, washing dishes, running the laundry machine, taking showers, brushing your teeth, and so much more! All this water we use is clean and safe for people to use. After we are done using the water, it goes down the sink, toilet, and other drains inside and becomes **wastewater**. Wastewater is water after people are done using it!

Wastewater is not clean water. When people are done using water there are germs and other things that makes wastewater unhealthy to be used again. This is because wastewater is water after you use it from these activities:

1. The water and the pee, poop, and puke you flush is wastewater!

2. The water after you clean your body from a shower or bath is wastewater!

3. Pouring something down the sink drain becomes wastewater!

4. The water after you clean your dishes or the water that leaves a dishwasher is wastewater!

5. The laundry machine water is wastewater!

All of this wastewater goes down different drains inside your house but it all connects to a big pipe underground that takes the wastewater to a treatment plant. We will learn about the wastewater treatment plant and how it cleans wastewater tomorrow!

Vocabulary

Wastewater: The water that has been used in homes, businesses, or buildings

Main Activity

The Four P's

There are only four things that you should only be flushing down the toilet. They are called "The Four Ps" because they all start with the letter P! (Toilet) paper, pee, poop, and puke are the only things that should be flushed down the toilet. Other items, even if they say they can be flushed, do not break apart in the wastewater and can get stuck in the pipes. Clogged pipes are hard to fix and cause big problems in your home and at the wastewater treatment plant. If it's not the four Ps then they should not be flushed down the toilet and should be thrown into the trash.

Materials: Writing utensil

Draw a line from the items to the toilet if they can be flushed. If they should **not** be flushed then draw a line from the item to the trash can.

Optional Activity

Wastewater Scavenger Hunt

Many things in our home use water that becomes wastewater after people are done using it. Some of the things are machines like the dishwasher or the laundry machine. Other things are sinks with a faucet and drain, showers and bathtubs, and the toilet!

Materials: Writing utensil

Instructions With an adult, walk around your home and find the items below. Make an "X" in the white box in each picture square with a pencil to show it's been found by you.

Wastewater Scavenger Hunt!

Choose one scavenger hunt item. Which did you choose?_____

List three things besides water that might go down this drain.

1._____

2._____

3._____

Where does all of this wastewater go?

_____

Optional Activity

Stormwater Stewardship Challenge for Day 3

One of the best ways to share ideas is through art! Let's make some together today.

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

Using what we have done so far, draw a picture showing one or more things you've learned this week, and write a sentence about it underneath your drawing. Share your picture with your teacher, a friend, or someone in your home.

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

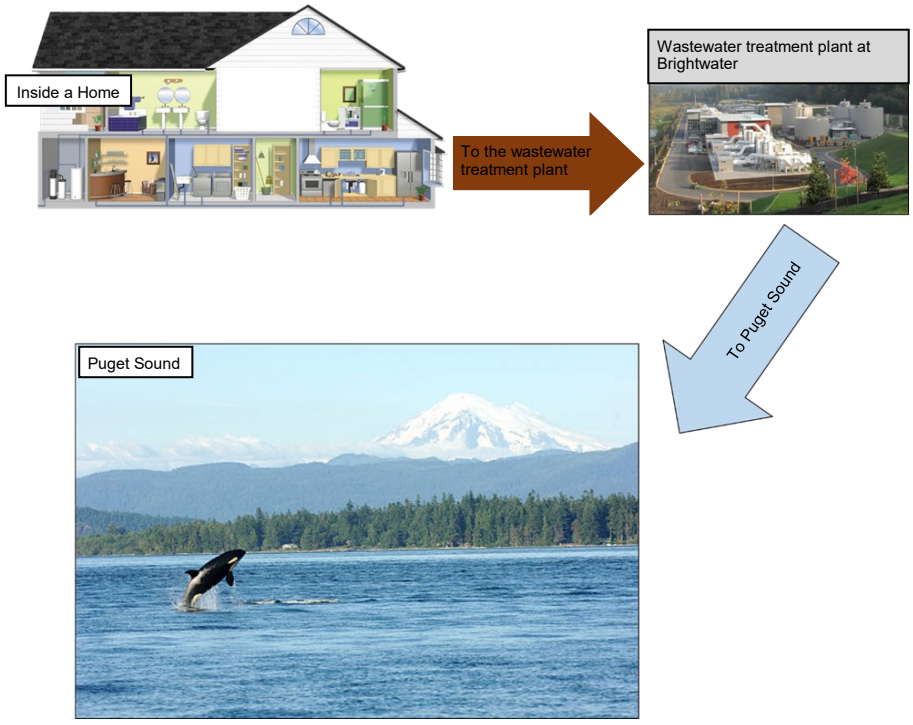
DAY 4

What Happens to Wastewater?

Yesterday we learned how wastewater is made in our homes from things we use every day. We also learned that wastewater is no longer clean water and people can't reuse this water at home. Wastewater goes down our toilet, sink, shower, and other house drains to connect with a big pipe under our buildings. These pipes travel underneath our cities and connect with other houses, apartments, and buildings that use water. They connect with many places and travel a long distance to take the wastewater to a **wastewater treatment plant**.

At the wastewater treatment plant the water is treated and cleaned through many steps. Each step removes all unhealthy things from the wastewater. Cleaning the wastewater is important! After the wastewater is treated then the water is sent through a big pipe going away from the wastewater treatment plant and to Puget Sound.

Puget Sound is the big body of saltwater and freshwater near big cities like Seattle, Tacoma, and Renton to name a few. Puget Sound is home to many different types of animals and plants. The wastewater treatment plant understands it is important to keep Puget Sound clean and healthy for all living things.



Vocabulary
Disinfection: The process of cleaning something to destroy bacteria
Wastewater Treatment Plant: A facility where wastewater is sent to be treated and cleaned

Main Activity

Wastewater Treatment Plant Puzzle

The wastewater treatment plant goes through several steps to make sure wastewater is clean before going into Puget Sound. We can think of the steps as first, second, and **disinfection** treatment.

The first treatment is where the wastewater is sent to a big tank and the water is moved extra slow! This lets the heavy pieces of human waste sink to the bottom so a big belt can scoop it out. The second treatment is another tank where tiny living things called bacteria are added. The bacteria eats anything unhealthy that is still in the wastewater. The third treatment or disinfection is where a small amount of bleach is added to destroy any leftover bacteria and make sure the wastewater is completely clean. Don't worry, the bleach will naturally fade away and leave the water before it enters Puget Sound. After disinfection, the cleaned water is now sent to Puget Sound!

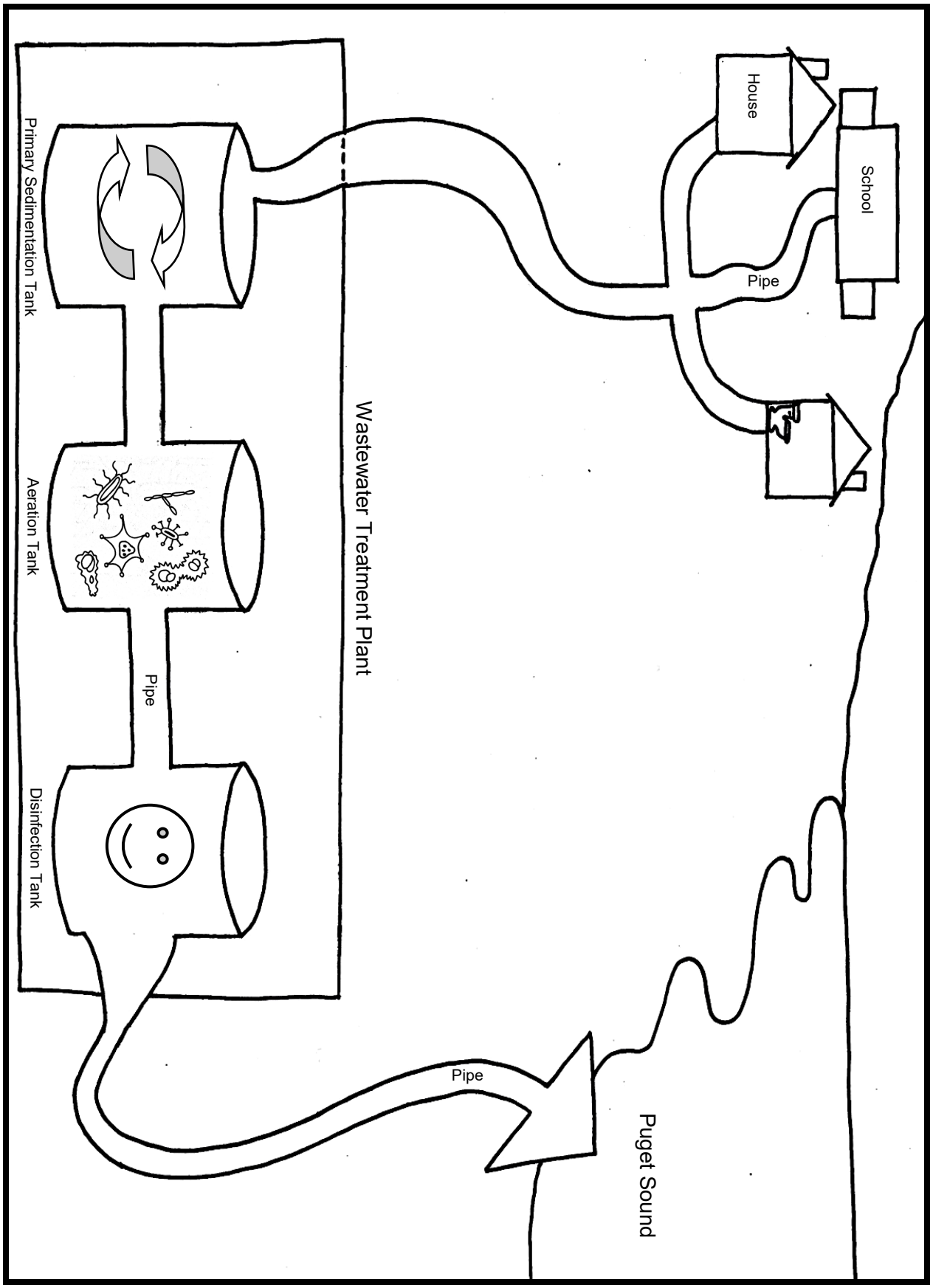
Let's practice to see how well we know the disinfection process and how the water travels from our homes and schools, to the wastewater treatment plant, and then to Puget Sound!

Materials: Crayons/markers/colored pencils, scissors, paper

Instructions:

1. Color the Wastewater Treatment Plant Puzzle on the next page.
    - Challenge: Color the water in the first tank dark brown, the second tank light brown, and the third tank white. This shows the wastewater is getting cleaned with each step!
2. With an adult, cut out the Wastewater Treatment Plant Puzzle board into 8 or 16 equal-sized pieces.
3. Turn the pieces upside down on a table so you don't see the picture anymore.
4. Mix around the picture pieces.
5. Turn the pieces back around so parts of the picture can be seen.
6. Put the puzzle back together to show how wastewater moves from our home, to the treatment plant, through the cleaning steps, and out to Puget Sound!

If you cannot print the pages, draw the puzzle on the next page on a piece of paper at home with an adult, and then complete the steps!


House
School
Pipe
Primary Sedimentation Tank
Wastewater Treatment Plant
Aeration Tank
Pipe
Disinfection Tank
Pipe
Puget Sound

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Optional Activity

Wastewater Treatment Model

One of the first steps at the wastewater treatment plant is to move the water very slowly in a big tank. Heavy materials in wastewater will sink to the bottom and lighter materials will float. This makes it easier for the treatment plant to scoop out the heavy materials and wash away the lighter material on the top. The wastewater that leaves the first step is a lot cleaner.

Materials: Jar with lid, water, oil, coffee grounds or soil

Ask an adult for permission to collect materials and for a good space to do this activity. This activity can get messy so doing it outside close to your home with an adult is best.
<u>DO NOT DRINK ANYTHING!</u>

1. Take the jar and add water so that it goes a little more than halfway.
2. Add a few drops of oil into the water.
3. Add one handful of soil or coffee into the water.
4. Close the jar with the lid. ***This is like wastewater as it goes into the first treatment step!***
5. Carefully shake the jar slowly till the oil and soil/coffee is mixed.
6. Leave the jar on a counter, table, or somewhere you can see. ***Do not open the lid.***
7. Watch the water. ***This is like wastewater moving slowly in the tanks at treatment plant!***
8. Where does the oil start to go in the water? Does it sink or float?
9. What happens to the soil or coffee? Does it sink or float?
10. After the material starts to settle in the water and things are not moving anymore, repeat steps 5-9 again for fun OR take the jar outside with an adult and carefully open the lid and pour the contents into the soil or near a plant. ***Save water!***

Optional Activity

Stormwater Stewardship Challenge for Day 4

What we flush down the toilet becomes part of wastewater. There are things we use in our homes that we should *not* flush. Toilet paper is the only item we should flush down the toilet along with pee, poop, and puke. Anything that are not the four P's should not be flushed and can clog pipes.

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

Make a sign to remind people in your home to only flush toilet paper. You can either color in the sign below, or use it as an example to write and color a sign on your own. You can also use the sign below to copy and color if you cannot print. When you're done making the sign, put your sign near the toilet for everyone to see. ***Ask an adult*** if it's okay to tape the sign onto the toilet or on the bathroom mirror.

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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- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd. Include the hashtag #dontflushtrouble

DAY 5

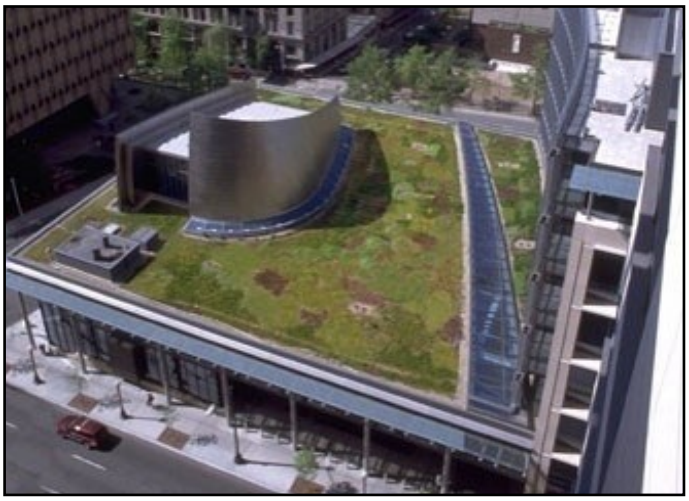
Green Projects

You learned a lot about water this week. You learned about how it flows and moves through natural and human-made places and how we clean it up after we are done with it. You even learned some **stewardship** ideas, or ways to protect and take good care of it!

Today we will look at a few more ideas that people are using to help control stormwater and keep it clean. We call these 'green' projects because they help nature.

One of the easiest ways that people can help control stormwater is by using **rain barrels**. These are large tanks that you can put next to a building in order to catch all of the rainwater that falls off the roof. This doesn't work for every building and roof and it is important to keep the barrel sealed up tight to prevent insects from getting in. It can be a wonderful source of water for your garden when installed the right way.

Another way to slow down the water that falls on city buildings is to put gardens on top of them! **Green roofs** are when people plant gardens or even lawns on top of a building. Not only do the plants and soil catch the rainwater, but they also help keep these buildings warm in the winter and cool in the summer!



Down on the ground level, you can find **rain gardens** in lots of different places. These are full of plants that love water, and have soil that is really good at soaking water up. You can often find these gardens near the side of the road, soaking up stormwater before it has the chance to empty out down a storm drain.

Finally, there are some amazing new projects that people are starting to build. One of them is **permeable pavement**! This combines the best parts of city roads and the forest floor: it is hard and solid, but was designed to have tiny spaces and holes that let water pass through it. Imagine emptying a bucket of water onto a parking lot and watching that water disappear into the ground like magic!

These are just a few of the things that people are building every day, and there are always new ideas to be had. You could even grow up and invent a brand new way to protect water!

Vocabulary
Green roof: A garden or lawn that is planted on a rooftop
Permeable pavement: Pavement that is designed to let water pass through it
Rain barrel: A large container used to collect rainwater
Rain garden: A specially designed garden that helps soak up stormwater and prevent flooding
Stewardship: Taking care of something, being a protector

Main Activity

Helping the Town

There are so many fantastic ideas that we can use to protect our water. Can you help show us where we could build some of these projects?

Materials: Scissors, writing utensil

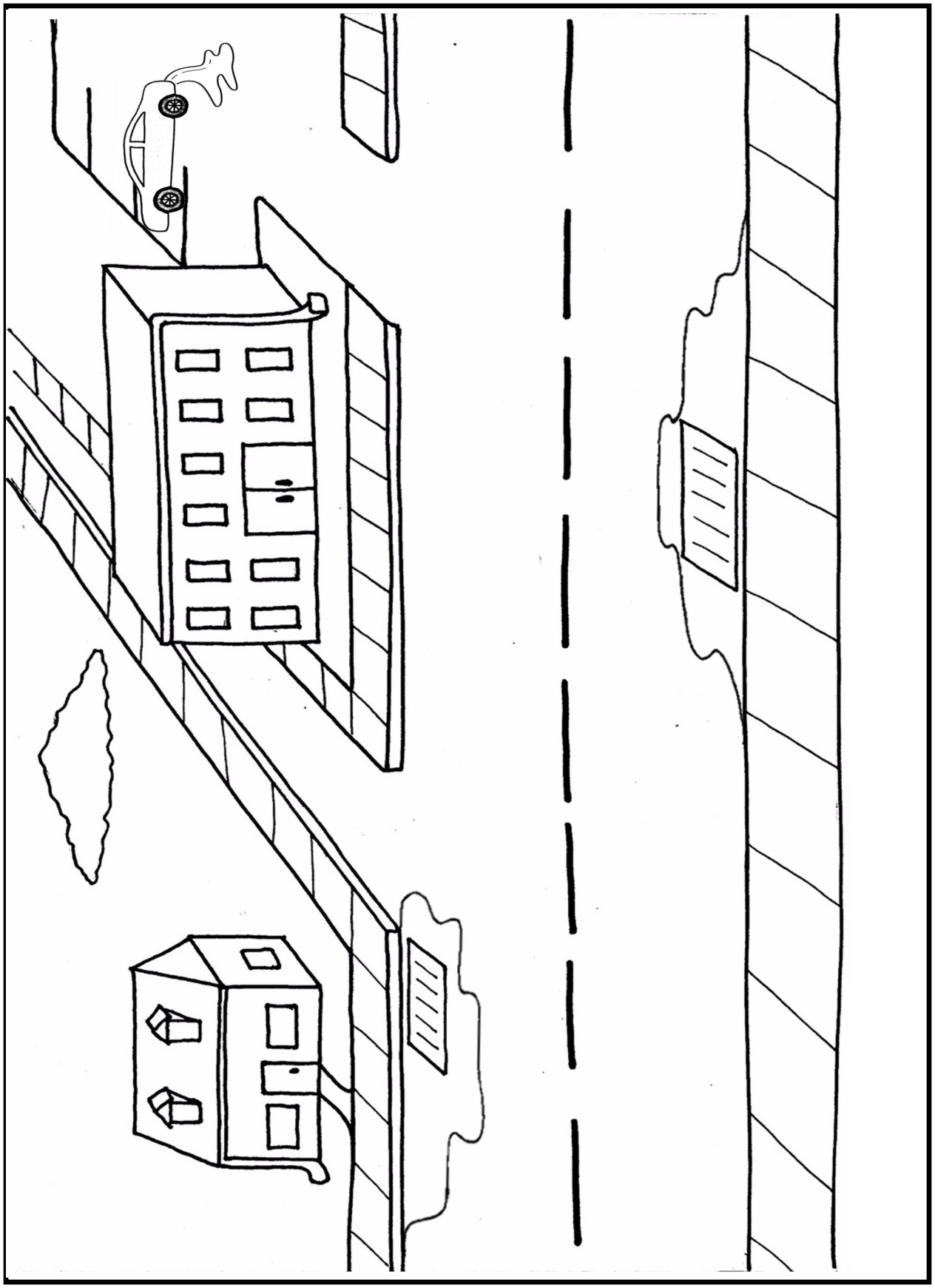
On the next page you will see a picture of a neighborhood that is not taking good care of the water that is passing through it. You will cut out some pictures that show all of the ideas you learned about today, and it is your job to place them around the neighborhood in any place that you think they belong.

Here is a list of the pictures you will be cutting out and placing around the neighborhood, and a quick review of why they are so helpful:

- Rain gardens: These gardens help to soak up and slow down water as it pours across the land, preventing floods, and holding pollution in place.
- Green roofs: Why have an empty roof when you can grow plants instead? Green roofs help capture water and prevent it from rushing down the gutter.
- Rain barrels: These catch the extra water that falls off the roof, which you can then reuse in the garden.
- Permeable pavement: Looks and acts just like normal pavement, but lets water pass right through it.

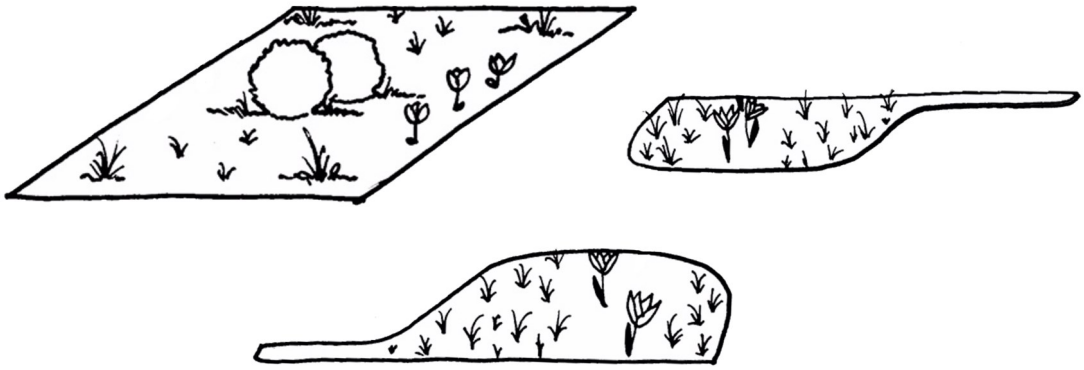
If you are unable to print and cut out these pictures, then draw your own neighborhood or even your school! You can show all the great spots to include these green stormwater projects:

- Is there a building where you could plant a green roof?
- Are there spots that constantly flood and might need a rain garden or some permeable pavement?
- Are they any gutters that pour water away, but could be filling a rain barrel instead?



Cut out each of these pictures and try to find a good spot for them in the town!

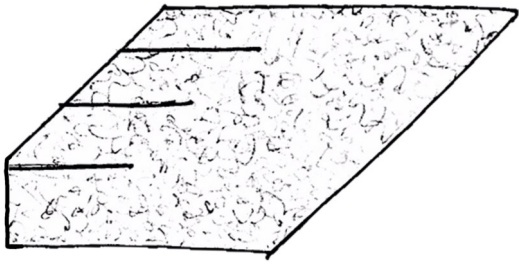
We have **rain gardens** to help control floods and fill in empty patches of dirt:



We have **rain barrels** to catch water that falls off of some rooftops:

We have **green roofs** to cover the top of some buildings:

And we even have **permeable pavement** to replace old parking lots:



Optional Activity

Stormwater Coloring Sheet

Adapted from materials created by City of Ann Arbor, Michigan

People can build stormwater projects right at home. Rain barrels and rain gardens are commonly found all around our neighborhoods.

Materials: Crayons/markers/colored pencils

You will find a coloring sheet on the next page, showing a house with both a rain barrel and a rain garden. Before you color everything in, let's think about the water that might be on its way!

It looks like there is a rain cloud gathering in the skies above this house! Using a blue pencil, marker, or crayon, draw rain drops falling from the cloud onto the top of the house.

Now that the rain has fallen on the house, continue using your blue color to draw a line anywhere that water would fall.

- Will it go to the left side, the right side, or both?
- Will it pass through anywhere while it travels?
- Where will it end up?

After you finish coloring everything in and following the water's path, remember what these projects look like. Next time you go out for a walk with your adult in your neighborhood, see if you can spot some rain barrels or rain gardens in real life!

IT'S LIKE A PIGGY BANK FOR RAIN!

A rain barrel captures water from your roof and saves it so you can use it to water lawns, gardens or indoor plants. It's good for the environment, too. Oh, rain barrel ... we love you.
To learn more, visit **a2gov.org/stormwater**.

THE UPSIDE FOR YOUR DOWNSPOUTS!

Rainwater that runs off your roof usually just ends up going down the storm drain – which can introduce pollution into local rivers and waterways. Rain gardens are an excellent way to help prevent that from happening and are easy to set up.
To learn more, visit **a2gov.org/stormwater**.

STORMWATER SMART

City of Bothell

King County Department of Natural Resources and Parks Wastewater Treatment Division

Cascade Water Alliance

Nature Vision

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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Answer Key

Day 5 Main Activity: Helping the Town

This is what your picture might look like when it is complete: