

# **Lesson 1: Paper Watershed Model**

## **Subject**

Watersheds

## **Objectives**

The students will:

- Create a model of run-off pollution in a watershed system and the effects of the organisms within it.
- Define problems of the watershed resilience and take action to improve their impact on the ecosystem.

## **Materials**

- Document camera
- Spray bottle
- Each person needs:
  - One half sheet of paper
  - One full sheet of paper
- Each group needs:
  - Clear tape
  - Red visa-v pen
  - Brown visa-v pen
  - Yellow visa-v pen
  - Black visa-v pen
  - Blue visa-v pen
  - Green permanent pen

## **Size/setting/duration**

Full class in lab groups/Indoor/

## **Background**

Learning about how water moves through the system helps students understand how their everyday actions can have an impact on the health of their watershed. This simple model introduces them to some common pollution sources to prepare them to take the Salish Sea Challenge and build new habits. While this model is extremely simple, it does a great job of showing students how the pollutants travel in the Salish Sea.



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Pacific  
Shellfish  
Institute



## Procedure

1. Begin the class by asking who has an idea of what a watershed is.
  - a. While the name might make you think it is a shed with water, think of shedding like moving off (like a pet shedding hair). A watershed is the area of land that drains to a body of water.
  - b. If you think of this in three dimensions you can almost picture a bathtub which sides are made up by peaks of mountains, all the water from this area “sheds” into one location.
2. How do you think that your actions might impact the health of your watershed? We are going to build a model watershed using paper.
  - a. Note: teacher can either model it for the class and have the students do it independently or you can work through each step with the class. Using the document camera is helpful for this exercise.
  - b. Everyone gets two sheets. Crumple one sheet & tape onto other – its smaller so keep to one side
  - c. Draw your simple city on the flat area – add your name and quick and simple lines and boxes for streets and houses using pencil or pen.
  - d. Using the markers add blue for water sources such as the ocean, rivers, lakes, and snowpack.
  - e. Green markers represent vegetation like trees and grass. You can also add larger green areas for the forest on the mountain, a park in the city, and farms.
  - f. Ask students for a show of hands for who owns dogs. One gram of dog poop (roughly the size of a marble) contains 23 million fecal bacteria. While the majority pick up after their pets, when they don’t it gets added to the watershed.
  - g. Red is going to represent chemicals like pesticides or fertilizers. This could be added by someone who uses fertilizer on their lawn or a farm that uses pesticides.



- h. In a town there are lots of cars. When people wash their cars in the driveway the soap is left behind. This is why it is better to go to a carwash where the soapy water is treated.
  - i. Cars also can leak oil or gas. This is more prevalent on roads or parking areas.
  - j. Once the models are complete the teacher can walk around with the spray bottle to add water to each model. Enough water should be added so that the pollutants travel into a pool on the model.
3. Have students compare their models. Consider locations of healthy and polluted water. Where would the students want to collect their drinking water in the model? Did some of the models end up with cleaner water than others? How does this model relate to the pollution in the Salish Sea?
  4. Hand out the Salish Sea Challenge. This is a list of ideas for ways you can have a positive impact on the health of your watershed and decrease the amount of CO<sub>2</sub> you are releasing. Take these home and make a commitment with your families to be stewards of the Salish Sea and practice watershed healthy habits. The back side of the worksheet has a table for students to log their actions and tally the number of times that it was completed. Students should be given at least two weeks to record their actions before turning the challenge back in. This helps us quantify the positive impact that your class and school have on the watershed!

### Next Generation Science Standards

Performance Expectations		
MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]		
Scientific and Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts
Asking questions and defining problems Developing and using models	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	System and system models Cause and effect Stability and change



## Extension

Students can work with their families to assess their carbon footprint using a [carbon footprint calculator](#). This can show families where they can change their habits to reduce their negative influence on the environment. [This calculator](#) has a middle school level option for students to use independently or in class. (The EXPLORE option does not require you to create an account).

There is also an optional extension worksheet to help students dive deeper into how pollution impacts the watershed.

## Worksheet



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# Salish Sea Watersheds Challenge

## **Be a Salish Sea Steward!**

### **RECORD YOUR ACTIONS & YOUR FAMILY'S ACTIONS AT HOME**

*Discuss actions you AND your family will DO to keep our waters clean?*

*Use the table on the back of this sheet to tally each time you DO your action.*

### **Are you meeting the Challenge?**

#### **Scoop the Poop!** Pet and livestock waste pollutes water if allowed to RUN OFF, spreading disease and causes algal blooms.

- o Scoop it! Bag it! Trash it! I WILL carry a bag and clean up after my dog on the street and in the yard.
- o I WILL encourage my cat to use a litter box, scoop the poop, bag it, and empty into the trash (not the compost bin).
- o I WILL keep livestock away from creeks and ditches and scoop the poop.
- o I WILL discourage wildlife by securing garbage cans, keeping pet food inside and not feeding ducks and geese

#### **Septic Sense!** WE WILL maintain our septic system. Failing systems can cause, property damage and water contamination.

- o Keep septic system in top working order. Have it inspected regularly and get my tank pumped when needed.
- o Spread out laundry and dishwasher loads to prevent overloading my septic system.

#### **On the Water!**

- o WE WILL make sure the valve on the boat's holding tank is kept in the closed position.
- o WE WILL never dump the holding tank into the water. WE WILL always use the pumpouts provided at the marina.

#### **Pounding the Pavement!**

- o I WILL NOT dump toxic materials down storm drains or on the ground.
- o WE WILL leave buffers of native vegetation at the base of hills and along the water's edge.
- o WE WILL position gutters so that they drain rainwater onto grass or garden beds, away from impervious surfaces.
- o WE WILL use pervious spaced paving stones, bricks, sand or gravel in our driveway and walkways.
- o WE WILL minimize impervious surfaces when remodeling or building.

#### **I WILL Conserve Energy & Reduce my Carbon Footprint!**

- o I WILL ride a bike or walk instead of driving.
- o I WILL turn off lights, appliances, and computers.
- o WE WILL put high energy-using items like water heaters on timers.
- o WE WILL buy local products and foods, **support our local farmers.**
- o WE WILL plant trees, vegetation, and cover crops.

#### **WE WILL Reduce, Reuse, and Recycle!**

- o WE WILL minimize the use and purchase of plastics.

In the city or on the farm – Let's do this together!



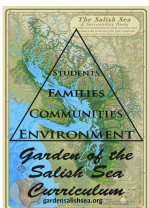
Action	Number of times completed (can be tallies)



## Key

### Watershed Model:

- Paper & tape = watershed
- Pencil = house, roads, your name
- Markers
  - blue = water (or snow)
  - green = plants
  - brown = dog poop
  - red = fertilizer & pesticides
  - black = oil & gas (*not too much!*)
  - yellow = car wash soap
  - Water spray = Rain!



Name : \_\_\_\_\_ Date : \_\_\_\_\_

## Watersheds and Pollution

1. What is a watershed?

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2. Describe what happened in your watershed model demonstration.

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3. How does pollution affect shellfish and shellfish farmers?

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4. What are two things you can do to help reduce pollution?

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**BONUS:** Shellfish help clean the water by eating \_\_\_\_\_. They are known as \_\_\_\_\_.

