Lesson 3: Paper Watershed Model

Primary Lesson Standard: MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Essential Questions:

1) Inquiry:
    a) What do you notice?
    b) What do you wonder?
2) How does land use and activities in watersheds affect water quality?
3) How can a watershed be made more resilient?

Career Connections:

1) How can city planners help mitigate runoff?

Learning Objectives:

Student will be able to:

1) Create a model of run-off pollution in a watershed system and the effects on the organisms within it.
2) Define problems of watershed resilience and take action to improve their impact on the ecosystem.
3) Understand how fecal coliform bacteria affect water quality and public health, and how they are measured.

Key Concept: 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 build new habits through the Salish Sea Challenge. While this model is extremely simple, it does a great job of showing students how the pollutants travel in the Salish Sea.

Vocabulary: Watershed, fecal coliform bacteria, pollutants, storm water runoff

Assessment: Worksheet in the GSSC student notebook.

Activity Instructions: *All parts of this activity can be found in this document.*

Teacher Prep/Considerations: Set up computer and projector. Review the Power Point to be sure background information is adequately understood to explain to students. Have the slideshow chart from Lesson 3 ready to review and add to if necessary.
Set up materials for students (provided by GSSC upon request):
Spray bottle
● Each person needs:
o One half sheet of paper
o One full sheet of paper
● Each group needs:
o Clear tape
o Red visa-v pen
o Brown visa-v pen
o Yellow visa-v pen
o Black visa-v pen
o Blue visa-v pen
o Green permanent pen

Print: Community Solutions for Clean Water.png as a poster for your classroom.

Have the first page of the slideshow on the screen.

Watch: Copy of Paper Watershed Video

Activity:

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: The 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 a document camera is helpful for this exercise.

b. Everyone gets two sheets. Crumple one sheet & tape onto the other.
c. Draw your simple city on the flat area – add your name and quick and simple lines and boxes for streets and houses using a 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.

3. 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.
4. 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?

Worksheet: Lesson 3: Paper Watershed Model Worksheet_Cascades

Watersheds and Pollution

1. What is a watershed?

A watershed is an area of land where all of the water that drains off of it goes into the same place.

2. Describe what happened in the watershed model demonstration.

Varies

3. Where would you want to collect your drinking water in this model?

Varies; the most common answer may be from the highest elevation.

4. How do you think pollution impacts the Salish Sea and the organisms that live in it?

Possible answers: lowers water quality, habitats are degraded, shellfish harvesting may have to stop, loss of organisms.

1. If you were helping to plan the city of Ferndale, what would you add to or remove from it to reduce the impact of city runoff?

Varies; possible answers include removing runoff surfaces like parking lots, adding more greenery and parks, adding stormwater runoff filtration systems, etc. Encourage students to use their imagination!

Optional Extensions:

- Explore the Salish Sea: A Nature Guide for Kids by Joe Gaydos-provided upon request
- Garden of the Salish Sea Curriculum Games Kit-materials provided upon request
- Watch Water from the Woods (6:50 minutes) to learn about how altering the Nooksack River and its surrounding forests has affected the Nooksack Watershed and the Salish Sea.
- Lesson on Invasive Species