

**Green Schools M.O.L.E. Kit
Lesson Plan
Stormwater**

State of Our Schoolshed (SOS)

Grade/Grade Band: Grade 4 or 5	Topic: Watershed science	Title of Lesson: Our Schoolshed! 2 class periods including 1 outdoors
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Summary of lesson:

Students explore their school's watershed and how it is part of the Chesapeake Bay.

Learning Outcome:

Students will be able to identify human made and natural features on their school site.
Students will be able to show their watershed inside the larger Chesapeake Bay watershed.
Students will be able to describe the flow of water on their schoolyard, and identify places where water flow(run off) may be causing erosion.
Students will be able to explain why runoff and erosion are problems for the Chesapeake Bay, and list ways to mitigate them.

Background Information for Educator:

Connections to NGSS and/or FCPS curriculum

5-ESS2-2 Earth Systems
5-ESS3-1 Earth and Human Activity
3-5 ETS 1-1 Engineering Design
Grade 5, Unit 1, Lesson 3: Hydrospheres; Lesson 6: Sphere Interactions
Grade 5 Unit 2, Lesson 7: Human Interactions

Grade 4

4-ESS2-1 Earth's Systems
4-ESS2-2 Earth's Systems
4-ESS3-2 Earth and Human Activity
Grade 4, Unit 3 Erosion

Background and Preparation:

A watershed is all the land area that when it rains, drains to the same body of water. The Chesapeake Bay watershed receives water from 6 states and DC. New York, Pennsylvania, Virginia, West Virginia, Maryland, and Delaware. Frederick County rainfall, ground water, snow, etc. eventually flows to the Potomac River via various smaller rivers (ex. the Monocacy) and streams.

<https://www.youtube.com/watch?v=QOrVotzBNto>

https://en.wikipedia.org/wiki/Category:Chesapeake_Bay_watershed#/media/File:Chesapeake_watershedmap.png

Since every Frederick County school is in the CB watershed, every school site is a small watershed that contributes to the whole. We call the school site watershed a “schoolshed.” Frederick County and city residents get their drinking water (potable water) from four water sources: Monocacy River, Linganore Creek, Fishing Creek, and Potomac River. Many in Frederick get water from wells that are fed by groundwater. All of these sources of water are filled from rain and snow. We need all of this water to be of good quality to provide a healthy habitat for local plants and animals, and water for various human needs...drinking, cleaning, bathing, cooking, etc.

The water from our rivers that is not captured moves farther down to the Chesapeake Bay. The Chesapeake Bay is the largest estuary in the United States - 64,000 square miles (five times the size of Maryland), and much of it shallow enough to receive sunlight. Because it receives sunlight, photosynthetic organisms are plentiful as are all the animals that depend on them for food! Thus, the Chesapeake Bay is economically as well as environmentally very important.

An estuary is a body of water where the fresh water from streams and rivers meet up with ocean water - the water is said to be brackish in an estuary: more fresh water at the mouth of rivers, but saltier closer to the opening to the ocean.

The Chesapeake Bay water quality is scored at a D due to runoff (water that runs off the land) carrying pollutants like fertilizer and pesticides, and erosion carrying tiny particles of clay and silt into the bay reducing the water quality and decreasing the amount of sunlight that can get to the underwater plants. There are ways everyone is working together to help the Bay - including reducing fertilizer and pesticide use, finding alternatives to both, filtering out fertilizer and pesticides before they get in the water, and holding on to soil.

This lesson introduces the Chesapeake Bay to students along with their own local environment. Students learn that there are many ways to help the Bay and one is to decrease erosion. This outdoor activity explores that issue.

This lesson involves students observing the natural and human made features of the school site in order to look for evidence of water flow. In order to facilitate this lesson instructors will need to: 1) Use Google Maps to find their school site, make a screenshot, and print student copies, and 2) take a tour of their school site before taking students outside.

Materials:

Clipboards
Copies of the school from Google Maps
Pencils, colored pencils
True or False: The Chesapeake Bay!
ONOW School Water Walk
Schoolyard Map Symbols
Schoolyard Report Card (optional)

Engage: Opening activity/starter meant to generate questions and interest - It will also allow the introduction of the task

T:
Who has heard of the Chesapeake Bay?
Who has been to or seen the Chesapeake Bay?

T:
Display the Chesapeake Bay and its watershed on a smart board.
https://en.wikipedia.org/wiki/Category:Chesapeake_Bay_watershed#/media/File:Chesapeakewatershedmap.png

- Where is Frederick?
- Does the Bay connect to the ocean?
- How does water get into the Bay?

When it rains here in Frederick, guess where that water eventually goes? Can someone show that on the map?

Define a watershed: We call all the land that drains into the same body of water a watershed.

If time, this activity can be done as a demonstration or students build their own watersheds.



<https://www.youtube.com/watch?v=y2lqz-NGHFE>

https://www.hood.edu/sites/default/files/Coastal%20Studies/UHS/LessonPlans_ManualFiles/AFF_cru_mpled_paper_lesson.pdf

Show watershed video. Really important: everyone lives in a watershed!

<https://www.youtube.com/watch?v=QOrVotzBNto>

Distribute Attachment 1.
True or False: The Chesapeake Bay!

	<p>Importance of the Bay - fish, crabs, and oysters; whole industries around each; plus recreation - boating, swimming, recreational fishing.</p> <p>Using the map of the Chesapeake Bay watershed, discuss questions below. https://en.wikipedia.org/wiki/Category:Chesapeake_Bay_watershed#/media/File:Chesapeakewatershedmap.png</p> <ul style="list-style-type: none"> <input type="checkbox"/> Is our school site part of the Chesapeake Bay watershed? Please explain. <input type="checkbox"/> Is New York City part of the Chesapeake Bay watershed? Explain.
<p>Explain:</p>	<p>T: Since our school site is part of the Bay watershed, and since the Bay needs our help we are going on a field trip into our own schoolshed to discover if we have any erosion areas.</p> <p>T: But before we do that we are going to map features that are on our schoolyard and then look for evidence of what happens to water when it rains.</p> <p>Attachment:  Schoolyard Map Symbols</p>
<p>Explore:</p>	<p>T: Hands out maps to students and  Schoolyard Map Symbols table</p> <p>T: What kinds of features do we see outside our school? Brainstorm....so we need symbols and legends. Students generate their own symbols in groups or teachers provide symbols.</p> <p>Review human-made versus natural features.</p> <p>Students add symbols to their maps.</p>
<p>Evaluate:</p>	<p>Gallery walk to view others work; students make edits to their maps.</p>
<p>A NEW DAY! Time to Get outside. Hopefully, after a rain or even during!</p> <p>Engage:</p>	<p>T: This is a map of Frederick County - https://frederickcountymd.gov/DocumentCenter/View</p>

	<p>w/319441/Watersheds_42x50</p> <ul style="list-style-type: none"> • Where is our school? • What is the name of our watershed?
<p>Explain:</p>	<p>T: Review rules for outdoor learning. T: Hand out clip boards and walk students outdoors as one large group. T: Orient all students to the map using one feature outdoors ex. Front door of the school. Students then move in small groups or as a class, make observations, and map the features (Rule: students have to stay in the teachers line of sight)</p> <p>Examples of features found on schoolsites: flagpoles, bike racks, large trees, parking lot, boulder, playground equipment, garden, grass, field, stormwater drains, conservation landscape, etc.)</p> <p>T: remind students to look for evidence of water flow - think roof, storm drains, hills...</p>
<p>Explore:</p>	<p>Attachment 2: Water Walk School Profile Students explore, make observations and edit their maps.</p>
<p>Elaborate:</p>	<p>Erosion Watershed Water cycle and its vocabulary; include groundwater Runoff</p>
<p>Evaluate and Extend: Discussion, conclusions, if any</p>	<p>Share evidence of any erosion on the school property.</p> <p>Brainstorm ideas for addressing any issues on the site - Ideas about stopping any erosion that is observed...</p> <p>Extension for subsequent lessons:</p> <p>Schoolyard Report Card as a measure of where our school is in helping the Chesapeake Bay or contributing to current condition</p> <p>https://www.cbf.org/document-library/education-resources/schoolyard_reportcard28aa.pdf</p>

	<p>From student generated ideas, students might write a letter to PTA or principal about the issue they discovered and a possible solution. (Grow grass, use mulch, plant perennials, stencil drains, etc.)</p> <p>After doing the Schoolyard Report Card, students may arrive at ideas as to how they can increase the environmental sustainability of their school. Ex.installing rain barrels, plant trees, create rain garden, native plant gardens, etc.</p>
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