StreamWebs

student stewardship network

OSU Oregon State University

Sea Grant Oregon

Lesson 1

Timeframe

One to two 50-minute class periods, depending on how much students know about watersheds

Materials

- Maps of the watershed (if you have them or are able to get them from a partner. Otherwise, Google Earth is a good alternative)
- Computers or tablets (one per group)
- Pictures of local bodies of water
- 3x5 index cards

Objectives

- Work together and collaborate in groups
- Learn about watersheds and identify your own local stream or river
- Identify where a particular stream's water originates, and where it flows to
- Research the local needs of your community and watershed

Discover Your Watershed

Teacher Background

This lesson is intended to help prepare students for an upcoming field experience by introducing them to the field site they will visit and helping them determine their research interests. Whether your students are doing a single field trip or multiple trips, we encourage you to use the opportunity to help them develop and answer an investigative question through the data they collect. A great resource to help them develop an investigative question is "Field Investigations: Using the Outdoor Environments to Foster Student Learning of Scientific Processes" (https://tpwd.texas.gov/publications/nonpwdpubs/media/field_investigation_guide.pdf).

There are most likely some organizations in your community that work to protect, monitor, and care for your watershed. This is a great time to invite them in to talk with your students about their local watershed before you go out. Staff might also be available to assist your students during their field trip or to provide other field resources such as equipment. Suggested organizations to reach out to include watershed councils, city parks, or other city/state departments tracking stream health such as transportation departments, state parks (if nearby), the Bureau of Land Management, Oregon Department of Forestry, the United States Forest Service, private agricultural or forestry businesses within the community (for example: Starker Forest in the Corvallis area), and nonprofits such as friends groups caring for a particular park or stream.

Description

In this lesson, students will be introduced to the concept of a watershed and learn about their own watershed. Students will use Google Earth to get to know their local watershed and to identify features of a watershed. Students will begin to understand what scientists study in a watershed, identify their own interests about the watershed.

Preparation

Teachers will need to spend time researching the watershed you and your students will work with and familiarize yourself with the headwaters (where a stream begins), mouth (where it meets and flows into another body of water, such as another stream or the ocean), and other important features (such as incoming streams or dams) along the stream you are studying. If you haven't already used Google Earth, you will want to spend some time becoming familiar with it and identifying the key features of your watershed that you would like to point out. You can download Google Earth at https://www.google.com/earth/

If you have not previously discussed watersheds with your class, you may want to do a lesson that provides a basic introduction before beginning this lesson. This would also be a great time to bring in someone from your local watershed council to conduct a watershed-based activity with your class (see extended learning).

Activity Introduction

Explain to students that they will be learning about their local watershed, understanding their role within a watershed, and discovering the needs of their watershed. Explain that they will eventually work in teams to design a field investigation they can conduct in their watershed.

Discuss the following as a class:

- We depend upon our natural resources for our health and needs such as clean air, food, and clean water.
- We monitor our resources, such as streams, to better understand the health of our resources.
- We will be planning an investigation in teams as a way to study and learn more about our local community, identify the needs of our local watershed, and discover what sort of work is done to maintain a healthy stream and watershed.

Next Generation Science Standards

DISCIPLINARY CORE IDEAS:

LS2.A: Interdependent Relationships in Ecosystems
ESS3.C: ESS3.A: Natural Resources

PERFORMANCE EXPECTATIONS:

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

MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

PRACTICES:

Practice 1: Asking Questions and Defining Problems

Part 1: What Does Your Watershed Need?

1. Using Google Earth, project your watershed at the front of the class, or assist students in navigating Google Earth to find their watershed. If you are using Google Maps, open and select the Terrain or Satellite view. Type into the Search box the locations you are interested in exploring (e.g., your school's address, a local creek, etc.) or click on the map to select each.
2. Save each location and, once you have the map locations, explore. Zoom in and out; use Street View and Photos to virtually visit each site. Point out landmarks such as schools, grocery stores, restaurants, and parks to give students a better sense of place.
3. As a class, identify the following characteristics and discuss:
    - What do you notice about our watershed? Where does our stream start?
    - Where does the water travel before entering the stream? *Over land, soil, rock, or pavement, and/or through the ground.*
    - Where does the water from that stream or river go? *To a bigger stream or river, to a lake, and/or to the ocean.*
    - What does it mean for a watershed to be healthy? *Elements include: correct temperature and chemical properties of the water, adequate tree and plant coverage for habitat and for filtering/slowing water, very little bank erosion, low levels of invasive species, etc. All of these attributes affect our drinking water.*
    - Who and what lives in a watershed? *People, fish, birds, our pets, deer, and other wildlife. Point out to students that other living and nonliving things, including buildings, rocks, soil, trees, and plants, all "live" in our watershed. Even your school and your house are part of your watershed.*
    - How do we impact our watershed? *Recreation such as hiking, fishing or camping can impact the watershed. We can have a negative impact by not properly disposing of pet waste or garbage, washing the car in the driveway or allowing other pollutants to run into the street and/or storm drains, allowing invasive species to grow in their yard, etc. There are also a number of ways that we can positively impact our watershed, such as removing invasive species and/or planting native plants.*

Guiding Questions

- What is a watershed? Which one do we live in?
- What local stream or river do we live close to?

Part 1: Continued

4. Start talking about potential places where students could collect data and/or conduct a field investigation. Work as a class to help students identify:
   - a nearby stream, river, lake, etc. where there is enough standing water for students to be able to collect data
   - other potential areas where they could collect their data for a field investigation.

5. Let students know they will be going out into the watershed to learn more about it! Ask them to think about what interests them most and give them a minute to jot down the top three things they want to investigate and learn while they are in the field. Note: You will want to consider which tools you have and the site you will be investigating, so you may want to provide students with some parameters.
6. Have students share their interests with a partner and then with the class. As students share, record topics and possible investigative questions on the board.
7. Hand out 3x5 cards and ask students to write down their top three interests or questions on the cards. Use these cards to arrange students into groups based on their interests or to develop a class research question.
8. If you are able to have students work in teams by interest, you will need time to arrange student research teams before moving on to Part 2. If you aren't able to have students work on separate projects, you can use their ideas to come up with research question the entire class can investigate.

Part 2: Developing an Investigative Question

1. Let students know that, before heading into the field, scientists know what they are looking to discover, based upon an investigative research question they are trying to answer or a problem they are trying to solve. Have students discuss (in groups or as a class) what they were interested in studying.
   - What interests do they all share?
   - What questions about the stream or watershed do they have in common?
   - What is one thing they could focus on together to study in the stream?

2. Now that students have an area of interest, walk them through the process of developing a good investigative question. Tell students they may refine their questions throughout the research process. Scientists are always learning and refining their questions and studies.
3. Have student discuss and follow these guidelines when creating a good investigative question:
   - Cannot be answered with a simple yes or no
   - Needs to be interesting to you
   - Must be able to measure/study within our timeframe and with our tools
   - Starts with words like:
     How does...
     What is....
     Would x affect y...

4. Share examples of investigative questions, and then have students work in teams to create an investigative question their team will study, or have them generate one question that the larger class will study. Example questions might include:
   - What is in our water, and how might it have gotten there?
   - What is our creek's amount of tolerant or intolerant macroinvertebrate species, compared to other creeks?
   - How much does the water temperature drop during winter?
   - Is this creek healthy for the fish that live here?

Part 2: Continued

5. Have each team share its investigative question(s) with the class. Will they be able to answer it/them with the tools and within the time allotted for your field investigation? Does it make sense for the watershed you are working in? If not, how can they change it?
6. After students have finalized questions, discuss how scientists often create an investigative plan to outline how they will conduct research to generate data. Students might document in a notebook logical steps written clearly so that someone else could follow the procedure. *What data will they collect? Which tools will they use? What part of the watershed will they study? How much data will they collect? Etc.*

Activity Wrap Up

Review with students what they will be studying when they head into the field. Assure them that, through the experience of getting out into the field and investigating their watershed, they will learn what to write down and become more comfortable recording field observations, such as specifics about what they see, hear, smell, do, and the data collected. Let students know that in the next lesson they will have the opportunity to learn more about the resources they will be using to collect data and study their watershed.

Extended Learning

Looking for lessons that will introduce students to watersheds?

Check out "Home, Home in a Stream,[1]" an activity compiled by Oregon State University's Science Math Investigative Learning Experiences (SMILE) Program; or "Crumple a Watershed," from Oregon Museum of Science and Industry (OMSI)!

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Published by Oregon Sea Grant, 1600 SW Western Blvd., Suite 350, Corvallis, OR 97333. Phone: 541-737-2714. Web: seagrant.oregonstate.edu/

This report was prepared by Oregon Sea Grant under award number NA16NOS4290143 (grant ID NA295A) from the National Oceanic and Atmospheric Administration (NOAA) StreamWebs Student Stewardship, U.S. Department of Commerce, and by appropriations made by the Oregon State Legislature. The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of these funders.

ORESU-E-17-002

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