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# K-12 Partnership Lesson Plan

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# *Wetlands: Not just a swampy place*

## Overview

Wetlands are a ubiquitous part of the southwestern Michigan landscape and provide numerous important ecological services. Wetlands allow water to slowly filter into the ground, which cleans water, provides a buffer against flooding, and re-charges groundwater supplies. They also provide habitat for many animal and plant species. Wetlands provide an opportunity for students to explore parts of the water cycle, food webs, and many other ecological processes. In this lesson, students learn about different types of wetlands and how they work through a series of presentations, games, and hands-on activities.

**Objectives**

At the conclusion of the lesson, students will be able to:

* Understand how wetlands affect water, wildlife, and ecological processes
* Understand how wetlands help prevent pollution and erosion
* Recognize that wetlands are complex systems that support many different forms of life, from top-predators to microscopic organisms

**Length of Lesson**

Introduction to wetlands presentation: 10 minutes

Types of wetlands activity: 10 minutes

How is this like a wetland? activity: 10 minutes

Model wetland demonstration: 10 minutes

Wetland food web activity: 10 minutes

Wetlands under the microscope activity: 40 minutes (if taking class to collect water samples), 20 minutes if not

**Grade Levels**

This lesson is designed for elementary school students

**Standards covered**

Disciplinary Core Ideas:

* **2-LS4-1**: make observations of plants and animals to compare the diversity of life in different habitats
* **5-ESS2-1**: develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact

Cross Cutting Concepts:

* Systems and system models
* Structure and function

Science and Engineering Practices

* Developing and using models
* Planning and carrying out investigations
* Constructing explanations and designing solutions

***Previous Michigan Standards Met:***

* **E.FE.02.11**: identify water sources (wells, springs, lakes, rivers, oceans)
* **E.FE.02.21**: Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground.
* **E.ES.03.41**: Identify natural resources (metals, fuels, fresh water, farmland, and forests)
* **E.ES.03.42**: Classify renewable (fresh water, farmland, forests) and non- renewable (fuels, metals) resources.
* **E.ES.03.43**: Describe ways humans are protecting, extending, and restoring resources (recycle, reuse, reduce, renewal).
* **E.ES.03.51**: Describe ways humans are dependent on the natural environment (forests, water, clean air, earth materials) and constructed environments (homes, neighborhoods, shopping malls, factories, and industry)
* **E.SE.06.11**: Explain how physical and chemical weathering lead to erosion and the formation of soils and sediments.
* **E.ES.07.41**: Explain how human activities (surface mining, deforestation, overpopulation, construction and urban development, farming, dams, landfills, and restoring natural areas) change the surface of the Earth and affect the survival of organisms.
* **E.ES.07.81**: Explain the water cycle and describe how evaporation, transpiration, condensation, cloud formation, precipitation, infiltration, surface runoff, ground water, and absorption occur within the cycle.
* **E.ES.07.82**: Analyze the flow of water between the components of a watershed, including surface features (lakes, streams, rivers, wetlands) and groundwater.

**Materials**

* PowerPoint slides (located at “Wetlands: not just a swampy place” lesson page on KBS GK-12 website)
* Pictures of the four different wetland types (bog, fen, marsh, swamp) (included in powerpoint)

For ‘How is this like a wetland?’

* Coffee filter
* Sponge
* Tums
* Seeds
* Pictures of a bed, kidneys, nursery, bridge, restaurant

For model wetland

* Clear glass casserole dish
* Modeling clay
* Sponges large enough to span a portion of the casserole dish
* Water
* Soil

For food web activity

* A card for each student with the name of an organism (frog, algae, deer, cattail, etc.) written on it (on lesson page website)
* Ball of yarn

For microscope activity

* Water collection cups
* Compound microscopes
* Slides and slide covers
* Wetlands Under the Microscope worksheet (on lesson page website)

**Background**

Wetlands are an important part of our landscape. In fact, approximately 15 percent of Michigan is covered in wetlands! A wetland is a land area that is either permanently or seasonally saturated with water. Wetlands also have characteristic vegetation associated with them, consisting of plants that are adapted to wet habitats.

Wetlands form when water accumulates in an area, either due to rainfall or upwelling of groundwater. Wetland plants begin to colonize the area, and it eventually becomes a habitat for numerous plant and animal species that depend on the wetland for resources, such as food and shelter.

### Activities of the session

1. PowerPoint Introduction
   1. Describe what a wetland is and how wetlands form.
2. Types of wetlands activity
   1. Break the students into four groups and give each group a picture of a type of wetland (a bog, fen, swamp, or marsh). Have each group describe the features they see in their wetland. Ask each group to compare the features of their wetland to the other groups’ wetlands.
   2. Show slides of each wetland type and describe in detail the differences between them.
3. How is this like a wetland?
   1. Give each group of students several objects or pictures of objects (such as a coffee filter, sponge, picture of a bridge, etc.). Have them come up with ways each object is like a wetland (i.e. a coffee filter filters coffee grounds out of liquid like a wetland filters soil out of water).
   2. Have each group share their answers with the class. Go over all the important roles that a wetland plays in the ecosystem.
   3. Answers: coffee filter, filters soil out of water; Sponge, absorbs water/prevents flooding; Tums, neutralize acids; seeds, provide food and cover as they grow; bed, a place for animals to rest; kidneys, filter toxins; bridge, provides a way for rain water to get to aquifers and/or provides a link between land and lakes/ponds/rivers/oceans; restaurant, provides food for residents and passing animals.
4. Model wetland activity
   1. Fill one side of a glass casserole dish with modeling clay, to simulate a hillside sloping down towards a body of water (see resources for link to wetland in a pan guide). Place sponges at the base of the ‘hill.’ The sponges represent a wetland.
   2. Have the students gather around and demonstrate what happens when it rains on the hillside, by pouring water over the clay. The wetland sponge should absorb most of the water. Next, remove the sponges and demonstrate what happens when it rains (the water will rush off the land and accumulate on the other side of the dish).
   3. Next, cover the modeling clay with moist potting soil, to represent topsoil. With the wetland sponges in place, demonstrate what happens to the soil when it rains (the wetland accumulates the soil and doesn’t let it travel into the body of water). Remove the wetland and demonstrate what happens to the soil. Talk about how wetlands can help prevent soil erosion and act as a filter for water moving from land to a body of water.
5. Wetland food web activity
   1. Show the students the slide with examples of all different kinds of creatures that live in wetlands. Talk about how wetlands are important habitats that provide resources to these organisms, and explain that all the different organisms interact with each other.
   2. Have the students stand in a circle. Give each student a card with an animal or plant it (frog, cattail, algae, deer, bacteria, duck, etc.). Give one student the end of a ball of yarn. Have the student keep hold of the yarn end, but pass the ball to another student in the circle. The student must explain how their animal or plant interacts with that of the student they are now connected to. Continue this until all students have been passed the ball of yarn one or more times and there is a large web of yarn connecting everyone in the circle.
6. Wetlands under the microscope
   1. Show students slides of microscopic organisms that live in wetland water. Explain that although we can’t see them without a microscope, they are important parts of the ecosystem that provide food for other organisms and break down dead plants.
   2. If there is a wetland near your school, take the students out to collect water samples from it. Samples can be taken in small cups dipped into the surface of the water. If there is no wetland near your school, you can collect water samples from a wetland elsewhere before class.
   3. In the classroom, have students examine the water they collected. Can they see anything in it without a microscope?
   4. Have students put a drop of water on a microscope slide and place a slide cover over it (for younger students, the teacher can do this in advance). Using compound microscopes, have students find organisms in the water (for younger students, the teacher can find and focus the microscope on organisms in advance). Have students draw what they see on the Wetlands Under the Microscope worksheet. They are likely to see diatoms and phytoplankton species (see resources for link to key to freshwater algae).

**Resources**

* Wetland in a pan guide: <https://www.nsta.org/sciencematters/docs/Shippensburg-Wetlands.pdf>
* Key to algae: <http://cfb.unh.edu/phycokey/phycokey.htm>