

Great Lakes Wetlands



Climate Change ADAPTATION Lesson # 1



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Lesson One: Wetlands in the Great Lakes Region

What are Wetlands and How are Freshwater Coastal Wetlands Unique?

Lesson Overview:

This lesson focuses on describing features of wetlands; identifying different types of wetlands, and, specifically, how coastal wetlands are unique. Students will review basic terms and information associated with wetlands to complete a chart that focuses on five types of wetlands.

Focus Questions:

Students answer these essential questions:

- What are wetlands and where are they found in Michigan?
- What are the different types of wetlands?
- Why are wetlands important and what is unique about Great Lakes coastal wetlands?

Next Generation Science Standards:

Obtaining, Evaluating, and Communicating Information: Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)

ESS2.E: Biogeology: Living things affect the physical characteristics of their regions. (4-ESS2-1)

ESS3.A: Natural Resources: Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)

ESS2.C: The Roles of Water in Earth's Surface Processes: Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)

ESS2.C: The Roles of Water in Earth's Surface Processes:

Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)

ESS2.A: Earth Materials and Systems: Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)

Materials:

- Tip of the Mitt Watershed Council, *Climate Change Adaptations for Coastal Wetlands: A Toolkit of Best Management Practices for Coastal Wetlands in Michigan*
- Wetland Background – Student Information Sheet
- Wetlands Habitat Chart – Double sided copy
- Internet access – Additional research

Time: 1-2 class periods

Objectives:

Students will be able to:

1. Define basic terms and processes associated with wetlands.
2. Identify different types of wetlands (marsh, bog, fen, swamp and swale.)
3. Describe the importance of wetlands in the environment.

Advance Preparation:

1. Make copies of Wetland Background – Student Information Sheet and Wetlands Habitat Chart. One set for each pair of students.
2. Have *Climate Change Adaptations for Coastal Wetlands: A Toolkit of Best Management Practices for Coastal Wetlands in Michigan* available digitally or printed copies for pairs of students. This document is critical for the mini-unit and it is recommended that copies be produced for use with all lessons.
3. Selected pairs/groups for completing chart.
4. Listed websites for students for extended research.

Common Misconceptions:

Students will learn the basics of what makes a wetland unique, but a common misconception occurs when students research *coastal wetlands* in general because there is a difference between ocean coastal wetlands and Great Lakes (i.e. freshwater) coastal wetland habitats. Make sure to make that distinction clear! Comparing ocean versus freshwater coastal wetlands may be an alternative method of introducing this unit.

Background Information:

The websites listed below are general background about wetlands. Coastal wetlands are a smaller subset that will be the focus of this mini-unit. All wetlands function similarly, but coastal wetlands have specific factors, lake levels and wave action for example, that create unique habitats for students to understand.

Websites for Background Information:

U.S. Environmental Protection Agency (EPA): Wetlands Education –General information, great activities and lessons

<https://www.epa.gov/wetlands/wetlands-education>

Michigan Department of Environmental Quality (MDEQ) Great Lakes Coastal Wetlands - Good background information for teachers on Great Lakes coastal wetlands specifically

http://www.michigan.gov/deq/0,4561,7-135-3313_3687-11177--,00.html

Fabulous Wetlands with Bill Nye The Science Guy – Wetlands video (6:50 min) – Good basic introduction

<https://www.youtube.com/watch?v=BeUPbGWg2KU>

MDEQ Wetlands Map Viewer – Move around the state to locate different wetlands!

<http://www.mcgi.state.mi.us/wetlands/mcgiMap.html>

Procedure:

1. Ask students what a wetland is and if they have ever visited a wetland. Students brainstorm features of wetland together or in pairs and then share with class via white board or poster.
2. Identify specific wetlands that will be the focus of the lesson/unit (Examples: Swamp, Bog, Fen, Marsh, Interdunal Swale)
3. Working in pairs, have students use wetlands informational document provided and websites to complete chart.
4. Project chart on white board or create large chart for class to fill in.
5. Invite teams to share information with class - Make sure that all pairs have accurate information!
6. Teams create a visual representation of one type of wetland on chart (poster, picture book, video, etc.). Share with class.
7. Discuss the following questions as a class:
 - What characteristics are shared by these habitats?
 - What species are found in more than one of these ecosystems?
 - What problems might humans cause for plants and animals within these ecosystems? (Global climate change and its effects, erosion, invasive species, habitat destruction, pollution)
 - What problems might nature cause for plants and animals within these ecosystems? (Global climate change and its effects, erosion, weathering)
 - Why is it important to conserve or protect these ecosystems?

Extensions:

1. Students share wetlands projects with another class or the community.
2. As a class, take a field trip to local wetland area and take pictures of wetland features.
3. Make models of wetlands in general, or specifically a Great Lakes coastal wetland. Lesson plans are listed below.

Additional Resources:

Teaching Great Lakes Science: Lessons and Data Sheets

<http://www.miseagrant.umich.edu/lessons/>

Teaching Great Lakes Science: Wetlands Lesson

<http://www.miseagrant.umich.edu/lessons/lessons/by-broad-concept/earth-science/wetlands/>

Teaching Great Lakes Science: Activity: Wetland in a Pan

<http://www.miseagrant.umich.edu/lessons/lessons/by-broad-concept/earth-science/wetlands/activity-wetland-in-a-pan/>

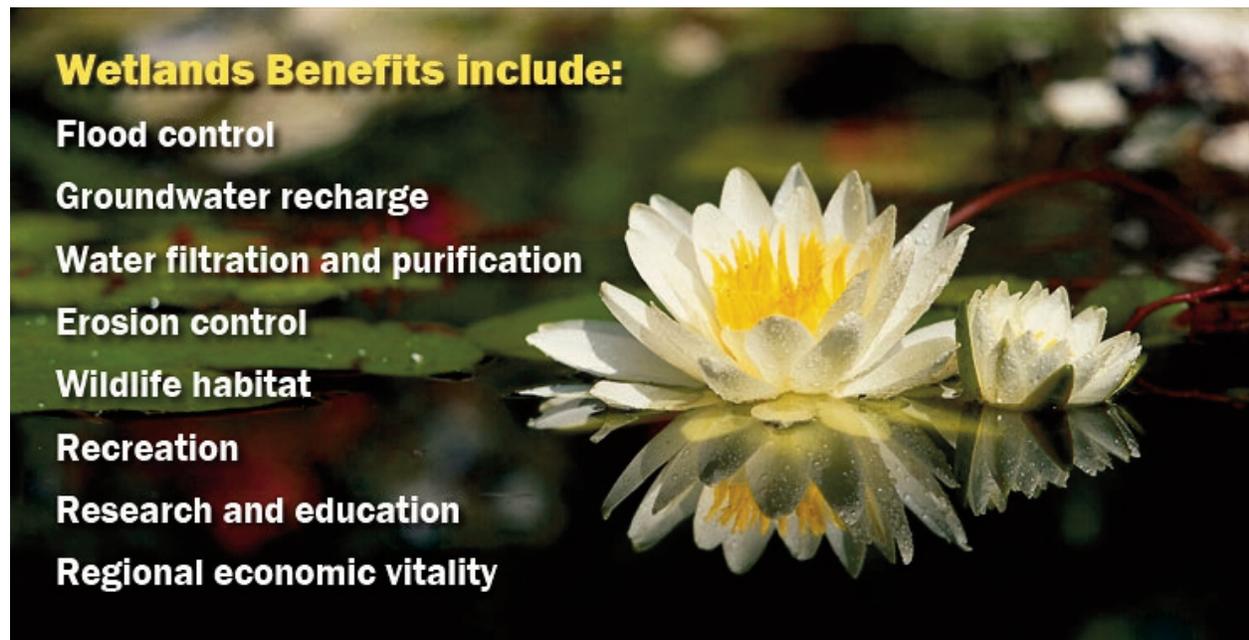
Adapted From:

Alliance for the Great Lakes: Great Lakes in My World Lesson 6

<https://greatlakes.org/get-involved/great-lakes-in-your-classroom/k-12-curriculum/>

Wetlands Background – Student Information Sheet

Wetlands are some of our most valuable natural resources –they are places of beauty that contribute greatly to the overall health of our environment and our quality of life. They provide untold functions and values that become increasingly important as we continue to lose them. Healthy wetlands protect water quality. They retain or remove nutrients and pollutants, acting as “nature’s kidneys.” Wetlands are also “nature’s nurseries,” providing vital habitat to fish, wildlife, and waterfowl. Wetlands control flooding by acting as a sponge. They decrease flood peaks and safeguard downstream property owners. They temporarily store flood waters and replenish ground water supplies. In their natural condition, wetlands associated with rivers and lakes function as a barrier to erosion.



Types of Wetlands

Aquatic Bed

Areas of shallow permanent water that are dominated by plants that grow on or below the surface of the water.

Great Lakes coastal wetlands

The hydrology of these wetlands is driven by Great Lakes water level fluctuations. There are different types of these rare wetlands due to substrate (clay, sand, muck) and exposure to wind and wave action.

Barrier-beach Wetland

A barrier beach wetland is formed when nearshore currents deposit a sand or gravel barrier bar across the mouth of an embayment. These wetlands form behind the sand barrier. The resulting shallow pond or lagoon is sheltered from the lake's

wave energy; sediments accumulate in the lagoon basin and vegetation can become rooted. Although water levels in the lagoon may be augmented by tributary streams and groundwater seepage, coastal lagoon wetlands are also partially controlled by the Great Lakes, through permanent or intermittent connecting channels, wave overwash, or cross-bar seepage.

Open Embayment

A curving section of shoreline that is open to the lake. Open embayments offer protection from the force of the lake in areas where shallow depth and gently sloping bottom topography reduce wave height and energy.

Protected Embayment

Many stretches of bedrock or till derived shorelines form small protected bays, typically less than three or four kilometers in width. These bays can be completely vegetated with emergent or submergent vegetation. Examples include Duck Bay and Mackinac Bay in the Les Cheneaux Islands on Lake Huron, Matchedash Bay on Lake Huron, and Bayfield Bay on Wolfe Island in Lake Ontario.

Interdunal Swale Wetland

A wetland dominated by grass-like vegetation that occurs in the low areas between sand dunes or beach ridges along the Great Lakes shoreline. These wetlands depend on the Great Lakes for their water source. As such, their water table and period of saturation fluctuates with Great Lakes water levels. Because of the highly variable ecosystem characteristics, and the fact that they exist nowhere else on earth, interdunal swale wetland/upland complexes support many endangered or threatened species such as the Piping Plover, Pitcher's thistle, Lake Huron tansy, and Houghton's goldenrod. Due to a combination of the natural fragility of interdunal wetlands and the loss of shoreline habitat due to development along the Great Lakes shoreline, these habitats are threatened.

River Deltas

River Deltas form as stream sediments deposited at the mouth of a river accumulate and create multiple shallow channels, low islands, and abandoned meanders that allow for extensive wetland development.

Marsh

A frequently or continually inundated wetland characterized by grass-like and other emergent vegetation adapted to saturated soil conditions. Typical marsh plants include rushes, reeds, sedges, cattails, and grasses. They are wet areas which can be periodically covered by standing or slow-moving water and are usually associated with ponds, rivers, streams, inland lakes, and the Great Lakes. Although some marshes have sandy soils, marshes usually have finer textured, nutrient rich soils with a high content of organic matter.

Peatlands

Peatlands occur as thick peat deposits in old lake basins or as blankets of peat across the

landscape. Their formation is due to the combination of cool temperatures and adequate rainfall in northern temperate regions around the earth. Peat-accumulating wetlands include both bogs and fens.

Bog

Bogs form in lake basins that are isolated from sources of ground water. Because normal rainwater (the only water source for true bogs) is slightly acidic, bog water tends to be slightly acidic. The acidic nature of bogs supports acid-loving (acidophilic) vegetation, especially Sphagnum mosses, and contributes to a deficiency in available plant nutrients. As a result, many plants, animals, and microbes have special adaptations.

Fen

A peat-accumulating wetland that receives some inputs of groundwater or drainage from surrounding mineral soils which typically results in alkaline waters and usually supports grass-like vegetation.

Swamp

A wetland dominated by trees or shrubs. Swamps are usually inundated or saturated periodically at some point during the growing season. The soils in swamps are usually rich in nutrients and organic matter. This is due to silt and organic matter deposited by flood events and the accumulation of organic matter (dead trees and other vegetation) over time.

Vernal Pool

An ephemeral wetland usually in a forested area. Vernal pools are small isolated wetlands that only hold water for a short time during the spring. After snowmelt, amphibians congregate in vernal pools to create another generation of frogs, toads, and salamanders. By midsummer, the water is gone from this important, yet ephemeral, wetland.

Wet Meadow

Wet meadows contain grass-like vegetation and saturated soils, but seldom have water standing on the ground surface. Many wet meadows occur in the former lakeplain of the Great Lakes, especially in southeast Michigan and the Saginaw Bay watershed. Because these areas are relics from a former geologic epoch, they provide habitat for many plant species rare in Michigan that are typically adapted to prairies. Unfortunately, a large percentage have been severely degraded or converted to agriculture or housing.

Wet Prairie

Wet prairie is a native lowland grassland occurring on level, saturated and/or seasonally inundated stream and river floodplains, lake margins, and isolated depressions in Southern Lower Michigan. Lakeplain wet prairie is a globally imperiled ecosystem. The majority of wet prairie acreage was converted to agriculture following European settlement. In Michigan, the size and number of wet prairies have been reduced so that today less than 1% of the original community remains. Today, only 15 wet prairies totaling 613 acres remain in Michigan. Lakeplain prairies are among the most diverse plant communities in Michigan, with as many as 200 plant species found within a single prairie remnant. Threats

to remaining sites include hydrologic alteration, nutrient enrichment, siltation, fire suppression, shrub and tree encroachment, and destruction of upland buffers.

For more information on wetlands go

to: <http://www.watershedcouncil.org/wetlands.html>

Wetland Habitat Chart

Use Wetland Background document and websites provided to fill out chart below.
Use bullets to indicate information, draw simple illustration of habitat, and list types of plants/animals.

Wetland Habitat	Description/Physical Characteristics	Flora (Plants)	Fauna (Animals)

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