

Functions of Wetlands

Objectives: Students will recognize that

- Students can describe what makes a wetland.
- Students can explain functions/importance of wetlands.

Overview: During this program students will learn about the functions of wetlands in the environment. They will explore how wetlands store & slowly release water as well as how these areas filter water. They will also explore the role of wetlands as habitat.

Materials: (the items that should be inside the kit or taken off the shelves in the storage building)

On Shelf:

- Binoculars

In Kit:

- Bucket to fill with pond water
- 2 plastic cups with handles
- 2 large sponges
- 2 large cookie sheets
- Paper (coffee) filters and/or paper towels
- Sieve
- Clear bucket to receive filtered pond water. A white or light-colored bucket may also be used in this activity
- Paper
- Hand sanitizer

Before Class Prep: Read background information. Get kit from staff (or storage building). Set up at arranged area where students can sit off trail as well as get up and move around. Set up the cookie sheets – upright & vertical at a 45 degree angle – on the side of the boardwalk or up against a wall. Fill a large bucket or two with (unfiltered) pond water.

Background Information:

Background information is for your knowledge and contains much more information than needed to share during school programs but may help answer your or participants questions.

(sourced from EPA)

What Is a Wetland?

Although wetlands are often wet, a wetland might not be wet year-round. In fact, some of the most important wetlands are only seasonally wet. Wetlands are the link between the land and the water. They are transition zones where the flow of water, the cycling of nutrients, and the energy of the sun meet to produce a unique ecosystem characterized by hydrology, soils, and vegetation—making these areas very important features of a

watershed. Using a watershed-based approach to wetland protection ensures that the whole system, including land, air, and water resources, is protected.

Types of wetlands include swamps, bogs, fens, & marshes. Marshes are periodically saturated, flooded, or ponded with water and characterized by herbaceous (non-woody) vegetation adapted to wet soil conditions. Swamps are fed primarily by surface water inputs and are dominated by trees and shrubs. Bogs are freshwater wetlands characterized by spongy peat deposits, a growth of evergreen trees and shrubs, and a floor covered by a thick carpet of sphagnum moss. Fens are ground water-fed peat forming wetlands covered by grasses, sedges, reeds, and wildflowers. In Colorado only 3% of our land is considered wetland. These wetlands fall into the marsh category (wet meadows, prairie potholes, vernal pools, etc.)

Why are Wetlands Important?

Wetlands are important features in the landscape that provide numerous beneficial services for people and for fish and wildlife. Some of these services, or functions, include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters and maintaining surface water flow during dry periods. These valuable functions are the result of the unique natural characteristics of wetlands.

Wetlands and Nature

Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. An immense variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish and mammals can be part of a wetland ecosystem. Climate, landscape shape (topology), geology and the movement and abundance of water help to determine the plants and animals that inhabit each wetland. The complex, dynamic relationships among the organisms inhabiting the wetland environment are called food webs. This is why wetlands in Texas, North Carolina and Alaska differ from one another.

Wetlands can be thought of as "biological supermarkets." They provide great volumes of food that attract many animal species. These animals use wetlands for part of or all of their life-cycle. Dead plant leaves and stems break down in the water to form small particles of organic material called "detritus." This enriched material feeds many small aquatic insects, shellfish and small fish that are food for larger predatory fish, reptiles, amphibians, birds and mammals.

The functions of a wetland and the values of these functions to humans depend on a complex set of relationships between the wetland and the other ecosystems in the watershed. A watershed is a geographic area in which water, sediments and dissolved materials drain from higher elevations to a common low-lying outlet or basin at a point on a larger stream, lake, underlying aquifer or estuary.

Wetlands play an integral role in the ecology of the watershed. The combination of shallow water, high levels of nutrients and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of fish, amphibians, shellfish and insects. Many species of birds and mammals rely on wetlands for food, water and shelter, especially during migration and breeding.

Wetlands' microbes, plants and wildlife are part of global cycles for water, nitrogen and sulfur. Scientists now know that atmospheric maintenance may be an additional wetlands function. Wetlands store carbon within their plant communities and soil instead of releasing it to the atmosphere as carbon dioxide. Thus wetlands help to moderate global climate conditions.

Fish and Wildlife Habitat

More than one-third of the United States' threatened and endangered species live only in wetlands, and nearly half use wetlands at some point in their lives. Many other animals and plants depend on wetlands for survival. Estuarine and marine fish and shellfish, various birds and certain mammals must have coastal wetlands to survive. Most commercial and game fish breed and raise their young in coastal marshes and estuaries. Menhaden, flounder, sea trout, spot, croaker and striped bass are among the more familiar fish that depend on

coastal wetlands. Shrimp, oysters, clams, and blue and Dungeness crabs likewise need these wetlands for food, shelter and breeding grounds.

For many animals and plants such as wood ducks, muskrat, cattails and swamp rose, inland wetlands are the only places they can live. Beaver may actually create their own wetlands. For others, such as striped bass, peregrine falcon, otter, black bear, raccoon and deer, wetlands provide important food, water or shelter.

Many of the U.S. breeding bird populations-- including ducks, geese, woodpeckers, hawks, wading birds and many song-birds-- feed, nest and raise their young in wetlands. Migratory waterfowl use coastal and inland wetlands as resting, feeding, breeding or nesting grounds for at least part of the year. Indeed, an international agreement established in 1971 protects wetlands of international importance and was developed because some species of migratory birds are completely dependent on certain wetlands and would become extinct if those wetlands were destroyed.

Flood Protection

Wetlands function as natural sponges that trap and slowly release surface water, rain, snowmelt, groundwater and flood waters. Trees, root mats and other wetland vegetation also slow the speed of flood waters and distribute them more slowly over the floodplain. This combined water storage and braking action lowers flood heights and reduces erosion.

Wetlands within and downstream of urban areas are particularly valuable, counteracting the greatly increased rate and volume of surface- water runoff from pavement and buildings. The holding capacity of wetlands helps control floods and prevents water logging of crops. Preserving and restoring wetlands together with other water retention can often provide the level of flood control otherwise provided by expensive dredge operations and levees. The bottomland hardwood- riparian wetlands along the Mississippi River once stored at least 60 days of floodwater. Now they store only 12 days because most have been filled or drained.

Water Filtration

After being slowed by a wetland, water moves around plants, allowing the suspended sediment to drop out and settle to the wetland floor. Nutrients from fertilizer application, manure, leaking septic tanks, and municipal sewage that are dissolved in the water are often absorbed by plant roots and microorganisms in the soil. Other pollutants stick to soil particles. In many cases, this filtration process removes much of the water's nutrient and pollutant load by the time it leaves a wetland. Some types of wetlands are so good at this filtration function that environmental managers construct similar artificial wetlands to treat storm water and wastewater.

Resources:

<https://www.epa.gov/wetlands/what-wetland>

Guiding Questions:

For Sponge activity

1. What do the cookie sheets and sponges represent?
2. What happens to the water flowing down each cookie sheet?

For Filter Activity

1. What does the coffee filter represent? What happens to the water after it is poured through the filter?
2. The deposits trapped in this filter represent what in a pond? (silt)
3. Notice that the water in the receiving bucket gets clearer as you (students) pour more pond water through the filter. Why does this happen?
4. Which container would you rather drink from or take a bath in?
5. Is this filtered water safe to drink? What could you do to make it safe?

For Habitat Activity

1. What kinds of plants and animals did you observe?
2. What other organisms do you think call this wetland home?
3. Why are wetlands valuable as habitat?
- 4.

Colorado Academic Standards:

4th Grade Earth Science -- Four major earth systems interact.

4th Grade Earth Science-- A variety of hazards result from natural process; humans cannot eliminate natural hazards but can reduce their impacts' effect.

2nd Grade Life Science-- A range of different organisms lives in different places.

5th Grade Life Science—Matter cycles between air and soil and among plants, animals, and microbes as these organisms live and die.

Lesson Outline

<p>Opening/Introduction (~3 min)</p>	<p>Welcome students to station and what you will be talking about today. Ask questions to gain an understanding of the group's knowledge and start point.</p> <p>Guiding questions: What is a wetland? Why do we need water? What issues can happen with water supplies? What do animals need in a habitat?</p>
<p>Key Talking Points (~5 min)</p>	<ul style="list-style-type: none"> • Describe the functions of wetlands both as a filter of water as well as a place that can store excess water as well as a place to call home. • If students have a strong grasp of those concepts you may also touch on ways humans mimic wetlands to serve the same functions.
<p>Hands-on Activity (15 -20 min)</p>	<p>Choose an activity based on age group and time. Further instructions on next page.</p> <ul style="list-style-type: none"> ➤ Wetlands as filters. ➤ Wetlands as sponges. ➤ Wetlands as habitat.
<p>Conclusion (~3 min)</p>	<p>Wetlands both store water as well as filter water and they also provide habitat for many organisms.</p>
<p>Assessment Questions</p>	<p>How could a wetland help in a flood situation?</p> <p>How do wetlands purify water?</p> <p>What happens to organisms that depend on wetlands for habitat if the wetlands disappear?</p> <p>How are people helped by wetlands?</p> <p>What consequences happen when wetlands are destroyed?</p> <p>How can humans use created wetlands?</p>

Hands-on Activities

	<u>Instructions</u>
Activity & Materials	
<p>Wetlands as Sponges</p> <p>Materials: Cookie sheets, sponges, water</p>	<ol style="list-style-type: none"> 1. Set up the cookie sheets – upright & vertical at a 45 degree angle – on the side of the boardwalk or up against a wall. 2. Moisten and wring out the sponges, placing them at the bottom of one cookie sheet. 3. Have students pour a cup of water simultaneously on the top of both cookie sheets, one with the sponges and the other without, and observe the run-off. 4. Demonstrate the gradual release of water by pressing on the saturated sponges.
<p>Wetlands as Filters</p> <p>Materials: bucket, pond water, sieve, coffee filter, smaller clear/white bucket</p>	<ol style="list-style-type: none"> 1. Fill a large bucket with (unfiltered) pond water. 2. Set up: <ul style="list-style-type: none"> • A sieve with a paper coffee filter and/or paper towel in it. • A smaller clear or white bucket to receive and view the filtered water. 3. Have the students, one at a time, fill a plastic cup with pond water and pour it into the coffee filter strainer. 4. Observe the buildup of silt in the filter. <p>Observe the color of and sediment in the filtered water.</p>
<p>Wetlands as Habitat</p>	<ol style="list-style-type: none"> 1. Give students binocs, paper, and writing utensils. 2. Ask students to spread out and record as many organisms as they can find in 5 min. 3. Regroup and share what they found having students raise their hands if they also found the same organism as one reported about by another student.