



Division of Outdoor Experiences

Wetland Biodiversity

Grade Level: 7

Length of Program: One 12-minute video

Setting: Asynchronous Remote Learning

State Standards:

Topic: Cycles of Matter and Flow of Energy

7.LS.1 Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments.

7.LS.2 In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

Theme:

Wetland systems cycle matter and energy in observable and predictable patterns with abiotic and biotic factors controlling populations and nutrient/energy flow. Organisms have unique structures and functions that help them perform roles within a wetland system.

Objectives:

Students will:

- Learn that nature is cyclical – with water, nutrients (ex: C, P, N, O), and energy
- Learn how abiotic factors contribute to the creation of a wetland biome
- Learn that biotic factors contribute to the creation of a wetland ecosystem
- Learn that energy is transferred between trophic levels in wetland food webs
- Explore the biodiversity in wetland systems and identify components of systems
- Understand how organisms are adapted/designed to survive in a specific habitat, like wetlands
- Be introduced to environmental issues such as bioaccumulation and toxicity
- Learn how abiotic and biotic factors can control plant and animal populations

Vocabulary

- Wetland – a permanently or temporarily wet area that supports plants and animals specifically adapted to wet or inundated, low oxygen conditions
- Aerobic - relating to, involving, or requiring free oxygen.
- Anaerobic - relating to, involving, or requiring an absence of free oxygen.
- Biome - a large naturally occurring community of flora and fauna occupying a major habitat

- Biotic - relating to or resulting from living things, especially in their ecological relations.
- Abiotic - physical rather than biological; not derived from living organisms.
- Ecosystem - a biological community of interacting organisms and their physical environment.
- Hydrophilic - having a tendency to mix with, dissolve in, or be wetted by water.
- Photosynthesis - the process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide and water.
- Respiration - a process in living organisms involving the production of energy, typically with the intake of oxygen and the release of carbon dioxide from the oxidation of complex organic substances.
- Eutrophication - excessive richness of nutrients in a lake or other body of water, frequently due to runoff from the land, which causes a dense growth of plant life and death of animal life from lack of oxygen.
- Food chain - a hierarchical series of organisms each dependent on the next as a source of food.
- Food web - a system of interlocking and interdependent food chains.
- Trophic level - each of several hierarchical levels in an ecosystem, comprising organisms that share the same function in the food chain and the same nutritional relationship to the primary sources of energy.
- Producer - an organism that produces organic compounds from simple substances such as water and carbon dioxide
- Consumer - an organism that derives the organic compounds and energy it needs from the consumption of other organisms
- Decomposer - an organism, especially a soil bacterium, fungus, or invertebrate, that decomposes organic material.
- Macroinvertebrate – a spineless creature that is large enough to be seen without the aid of a microscope
- Larva - the active immature form of an insect, especially one that differs greatly from the adult and forms the stage between egg and pupa, e.g. a caterpillar or grub.
- Nymph - an immature form of an insect that does not change greatly as it grows,
- Metamorphosis - the process of transformation from an immature form to an adult form in two or more distinct stages. Usually involves a pupa stage.
- Incomplete metamorphosis – the process of transformation from an immature form to an adult form, without a pupa stage.

Program Outline:

Session 1:

1. Nature is cyclical
 - a. As students are probably aware, water moves through the environment in a cycle called the water cycle
 - b. Other elements of an environment are also cyclical. Nutrients, oxygen and energy travel through biotic and abiotic factors as they travel their cycle.
 - c. These cycles and the amount of nutrients, oxygen and energy dictate their biome.
2. Biomes and Ecosystems
 - a. What is a biome? What is a wetland biome?

- i. Abiotic factors such as hydric soils and their subsequent anaerobic conditions create a wetland biome.
 - b. What is an Ecosystem? How does an ecosystem function? What is a wetland ecosystem?
 - i. The flora and fauna that exists in a wetland biome, and their interactions among each other and with the abiotic factors create a wetland ecosystem.
- 3. Wetland cycles
 - a. What nutrients and elements travel through a wetland? How do they enter and leave the ecosystem? What impacts do they have on the ecosystem?
 - i. Discuss having too little of a nutrient/element (ex: oxygen) or too much of a nutrient/element (ex: nitrogen) can lead to different conditions and difficulties for organisms within that ecosystem.
 - b. How does energy flow through a wetland?
 - i. Show a simplified food web for a wetland system
 - ii. Discuss trophic levels or organisms in a food web
 - 1. Energy (nutrient) is transferred through predator-prey links from the base (primary producers) to the top predator
- 4. Wetland Organisms
 - a. What organisms live in a wetland? What is a macroinvertebrate?
 - i. Discuss how roles may change at various life stages, such as a nymph or larval stage vs. Adult
- 5. Collection and study of Macroinvertebrates
 - a. Demonstrate how to use equipment to collect and examine wetland wildlife safely.
 - b. Show how to identify macroinvertebrates using a dichotomous key.
 - c. Discuss where the organism may fit in food web
 - d. Point out & have students depict adaptations of organisms found and discuss their roles
 - e. Introduce environmental concepts such as bioaccumulation, toxicity, and invasive species and discuss their effects on food webs, such as the Great Lakes.
 - f. Discuss biodiversity and how that plays a role in determining a healthy ecosystem
- 6. Trophic level controls
 - a. Using the information about food chains and food webs and trophic levels, discuss how biotic factors lead to the control of population of different species.

Enrichment Activities:

Images/close-ups of macroinvertebrates, ID and adaptations:

<https://www.macroinvertebrates.org/>

Videos of live macroinvertebrates from Stroud Water Research Center:

<https://www.youtube.com/playlist?list=PLrmuh958ChiYW&rl8-i6jmuYncr7LHb7j>