MIDDLE SCHOOL
CURRICULUM

BECOMING A WETLANDS ECOLOGIST

NATIVE AMERICAN TRIBES OF WISCONSIN

The Native American Educational Series

Act 3D Resources

I. Enduring Knowledge:

Students should understand and appreciate the roles of scientists in analyzing, preserving, and protecting wetlands, as well as experience the joy of scientific discovery themselves. They should have a deep understanding of why wetlands play an important role in the ecosystem, and know what the impact of some human activity on the environment can be.

Learning Targets:

- Students will be able to define the features of a wetland and the various types of plants and animals it sustains.
- Students will experience the observation techniques implicit in scientific discovery.
- Students will be able to identify a wide variety of plants, microbes, amphibians, birds and mammals that live in wetlands.

II. Teacher Background Materials:

This video is a highly motivational description of how a student can become a “wetlands ecologist” and experience scientific discovery on his/her own. It could serve as a class assignment or as a special assignment for students who benefit from independent or active learning situations.

You might want to have the students view the video ahead of time and decide who would like to take on the challenge.

In order to complete the experience students will need the following materials and equipment:

- **Poster board** on which to draw an ecological pyramid (See attachment)
- A **journal** or **notebook** in which students will write their observations as they study the wetlands first hand
- **Dipping net** or **sieve** to be used to collect specimens found in the water
- **Butterfly net** (optional) this could be used to gather and observe different insects
- **Magnifying glass** (or microscope) to be used to study small items found in the water or soil
- **Binoculars** to be used to observe birds or animals from a distance
- **Internet access** to be used to identify various creatures that they observe in the wetlands (A list of sites for wetlands study is found at the end of this section.)

Scientists estimate that before European settlers came to Wisconsin, we had 10 million acres of wetlands here. But as people farmed the land and built roads and cities over time, they drained the wetlands. By the time they finally made laws to help protect wetlands, we had lost half of our wetlands. That's five million acres (almost 8,000 square miles).

Wetlands are important to the ecosystem because they act as buffers between surface runoff and rivers, and reduce flooding peaks by as much as 60 percent. An acre of wetlands can store over one million gallons of floodwater, so they can help save lives and property. They also fight pollution by supplying clean water to our lakes, streams and rivers. When rain and melt waters flow through farms and cities, they can pick up pollution. If those waters flow through a wetland, the wetland naturally filters out most of the pollution. By the time it enters a lake or river, it's clean. Thus, wetlands are like natural waste treatment plants.

Wetlands also support huge numbers of animals and plants. This study emphasizes and amplifies this fact.

Vocabulary:

1. **abiotic:** the non-living parts of the wetland ecosystem, like sunlight, water, air, soil, and nutrients
2. **biotic:** the living parts of the wetland ecosystem, like plants, insects, amphibians, birds, and large predators, like bear
3. **consumer:** in this study, it refers to those living things that depend on the wetland plants, insects, fish, etc., for their sustenance
4. **ecosystem:** a biological community of interacting organisms and their physical environment
5. **predator:** an animal that naturally preys on others; in a wetland the plants, animals, and birds depend on their prey for survival; Hence, the destruction of wetlands also affects the life of the animals that live around or within the wetlands.
6. **producer:** in this study producers refer to aquatic plants and phytoplankton that provide sustenance for amphibians, fish, and predators, such as bear or beavers.
7. **wetlands:** land consisting of marshes and swamps; saturated land

You might be interested in extending this curriculum to include activities related to a more narrow scientific study; for example, a student might just look at what is found in the water (aquatic biologist) or plants (botanists) etc.

Occupations related to wetlands:

1. **wetland ecologist:** scientists who study how all the parts of the wetland ecology interact with each other
2. **aquatic biologist:** scientist who studies the fish and creatures who live in water
3. **botanists:** scientists who study native and non-native (invasive) species of plants

4. **ecologists:** scientists who study and manage all of interrelated parts of the environment and ecosystem
5. **hydrologists:** scientists who study the wetlands water cycle
6. **resource managers:** professionals who work to include various natural resources, including wetlands, in land management plans
7. **water quality managers:** those who study and help control how wetlands and other natural land features impact our water quality
8. **wetland program coordinators:** those whose job it is to manage, restore, and protect wetlands, such as people who restore cranberry bogs to wild rice beds, which would have originally been found in the wetlands

Websites to support this study:

www.wetlands.org Wetlands International is a global organization that works to sustain and restore wetlands and their resources for people and biodiversity.

www.wisconsinwetlands.org/gems provides pictures of different ecological settings that are considered wetlands such as bogs, fens, marshes, swamps, etc.

water.epa.gov/type/wetlands/index.cfm a wide-ranging site that contains information about wetlands

www.fws.gov/wetlands The U.S. Fish and Wildlife Service produces information on the characteristics, extent and status of the nation's wetlands.

dnr.wi.gov/wetlands/mapping.html a site that maps Wisconsin wetlands

http://www.uwgb.edu/biodiversity/herbarium/wetland_plants/wetland_plants01.htm a site to help identify wetland plants

www.wi.nrcs.usda.gov/programs/wrp.html voluntary program to restore and protect wetland on private property; this might be a place to identify wetland restoration projects in the students' neighborhoods in which they could participate.

www.epa.gov/gmpo/education a site that has pictures of wetland creatures

SEARCH SUGGESTIONS:

- Wisconsin wetlands map
- Wisconsin wetland inventory
- Wisconsin wetlands association
- River Alliance of Wisconsin

III. Prior Knowledge:

Ask students if they have ever explored a wetland area (swamp, fen, marsh, etc.). If they have, ask them to describe what they found there. If they haven't, ask them what they think they might find there. Make a class list.

IV. Viewing Guide:

As students view the video have students make a list of the steps involved in becoming a wetlands ecologist. (Example below)

- Identify a wetland to study.
- Get permission to study it if it does not belong to your family.
- Get a signed permission slip from your parents saying that you are allowed to make the study.
- Draw an ecology pyramid on a large piece of poster board.
- Gather the equipment you need for your study: net, magnifying glass, container to hold water, a camera or cell phone with a camera, binoculars, journal and writing utensil.
- Begin your study collecting, focusing at first on abiotic conditions; on subsequent studies, observe plants, animals, birds, etc.
- When you return, record your findings on your pyramid.
- Return to the wetland at different times of the day to see if you find things that were not there at other times.
- Share your findings with your class.
- Combine your findings with other classmates who have made a study.

V. Discussion Guide:

- Go back to the prior knowledge discussion and ask students if any of their views had been changed by watching the video.
- Have students talk about the effects of human land use on the wetlands. For what purposes are wetlands drained and converted to human use? *(farming, housing development, roads and highways)*

- Determine whether all the students will participate in this activity, or if it will be a special assignment for particular students.
- Once you know who will be participating, have the students make up the list of steps involved in becoming a wetlands ecologist. Determine where the equipment needed for the activity can be found.
- Talk about areas nearby that qualify as wetlands. You could have the students do an Internet search to determine the different types of wetlands in Wisconsin and checking maps, pick out some of the different ones to be studied. (If a variety of types of wetland are readily available for students to study, this will add a wonderful dimension to the project by having students compare their findings from the different areas.)
- Decide what form the presentations will take; for example, whole class presentation, small group presentation, special audience presentation, etc.

VI. Evaluation:

Evaluating student work in this curriculum is dependent upon the extent to which all students participate, or if a small number of students wish to become “wetlands ecologists”. Some possible areas of assessment for the whole class include checking to see if the students took proper notes. If a few students are participating, they will have several products that can be assessed: their completed ecological pyramid; their journal entries (and perhaps sketches); the photographs that were taken. Advanced students might choose to make a video of other students doing the research.

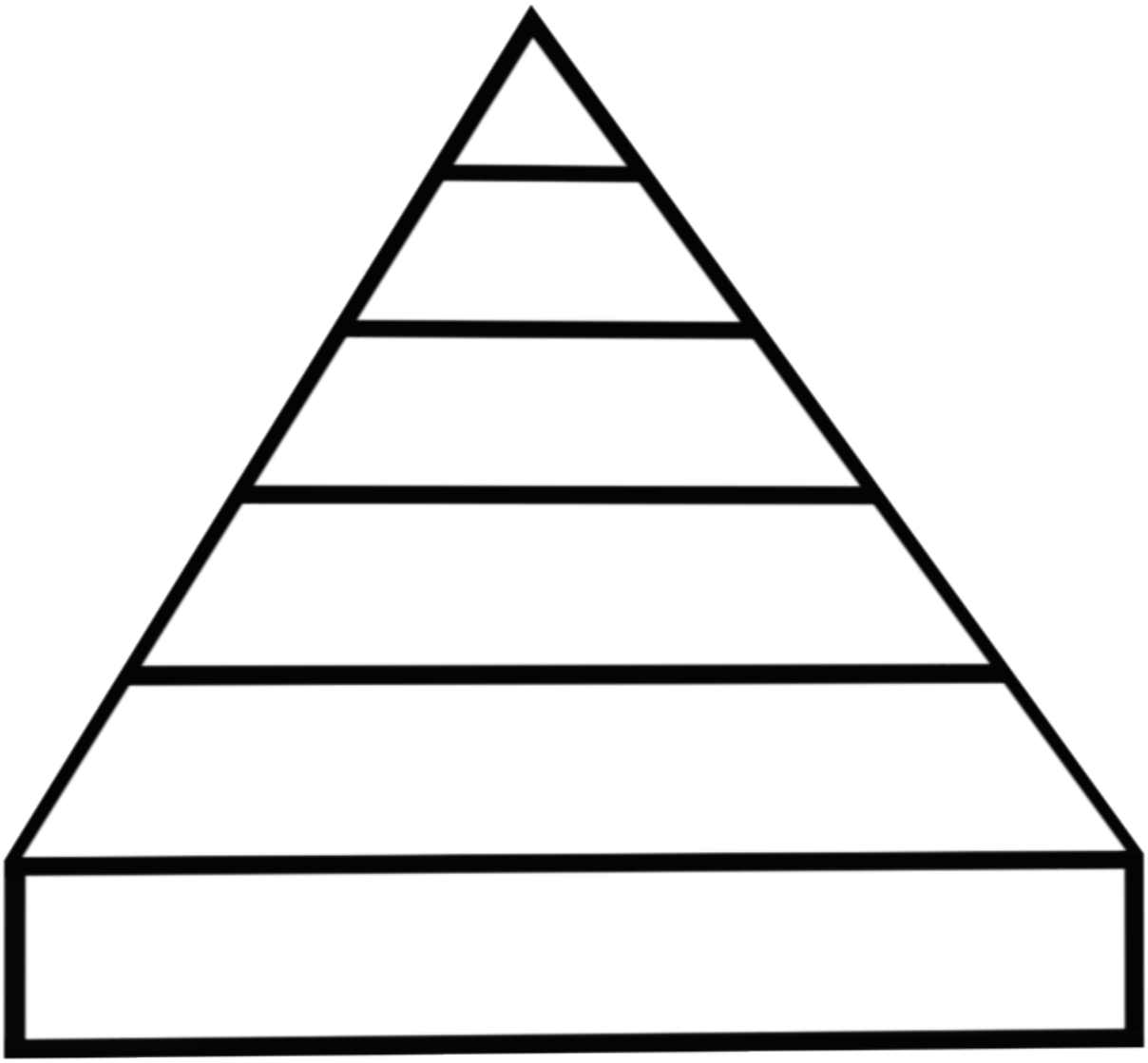
Suggestions for extended learning:

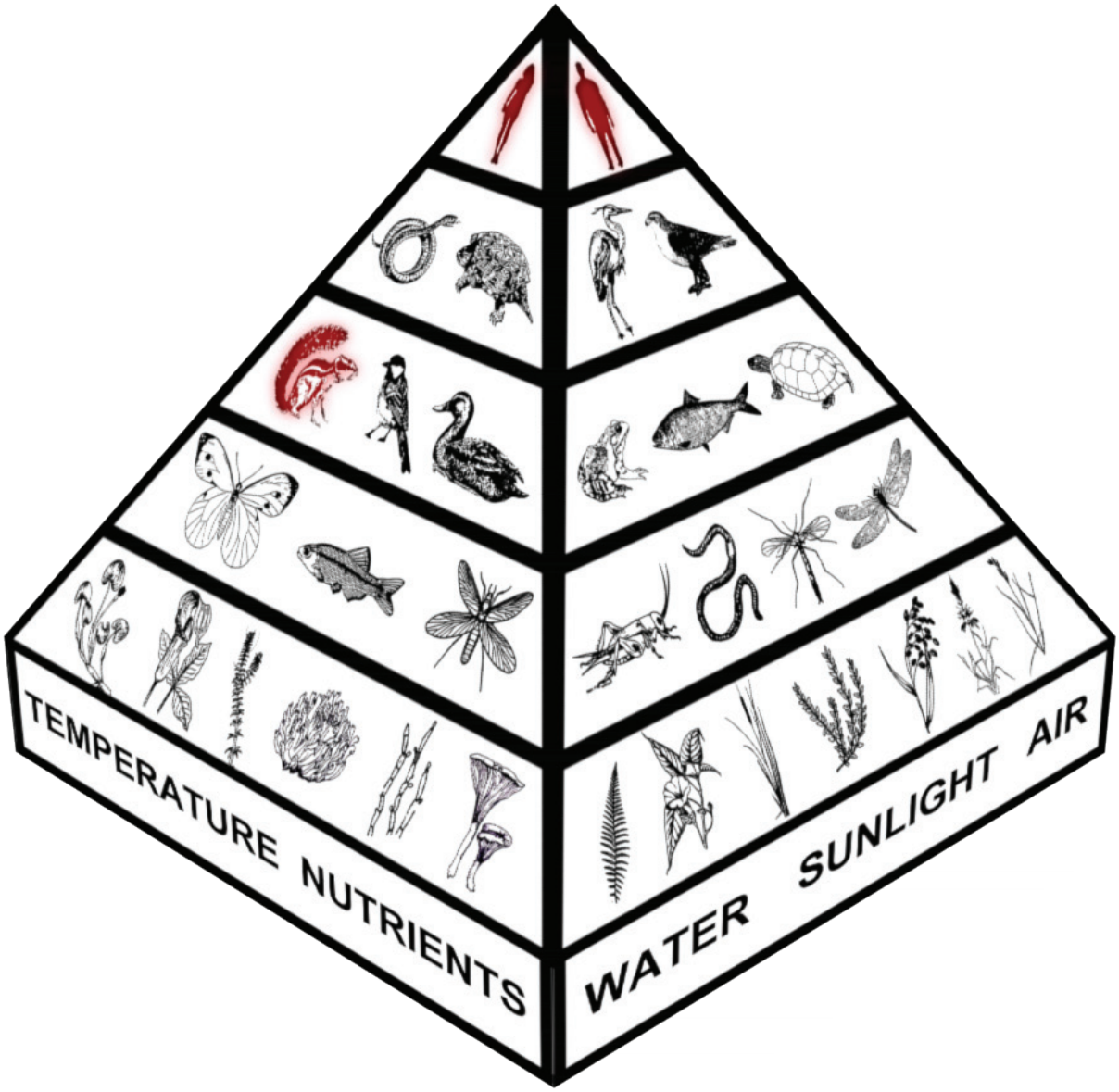
- Have students use the ecological pyramid to study a different type of ecosystem; e.g. stream or pond; forest; meadow.
- Have students create a mural depicting the wetlands environment, from the smallest creatures found in the water to the likely mammals that live in or around the wetland. Be sure to have them represent the abiotic factors.
- Invite speakers to the classroom. You might be able to find a wetland ecologist to come and hear the student presentations and then add to the students’ knowledge base. You could also have an aquatic biologist, a hydrologist, or a wetland program coordinator talk to your class.

- Have students research some of the wetlands restoration projects in your area. Have them consult maps about what wetlands have been drained for farming or development. See what the effect on the land has been. Write a letter to the DNR or an assemblyman or senator about the student's views.
- Have students make posters about each of the key levels of the ecological pyramid: abiotic factors, producers, and consumers. Ask them to note where there is overlap.
- Have students make posters of wetlands birds and see if they can find more information about the habits of some of them. For example, what is the difference in survival needs between a Red-winged Blackbird and a heron?

WETLAND ECOLOGICAL PYRAMID

In small groups, work together to fill in each level of the pyramid with words or drawings.




TEMPERATURE NUTRIENTS
WATER SUNLIGHT AIR

The following Wisconsin Student Proficiency Standards can be met by teaching *Becoming a Wetlands Ecologist:*

SCIENCE:

CONNECTIONS:

How evidence explains phenomena

INQUIRY:

Understanding how questions direct research

EARTH SCIENCE:

Earth history & structure of earth

SOCIAL STUDIES:

GEOGRAPHY:

"Students in Wisconsin will learn about geography through the study of the relationships among people, places, and environments."

A.8.1; A.8.4; A.8.6; A.8.8; A.8.11

ECONOMICS:

"Students in Wisconsin will learn about production, distribution, exchange, and consumption so that they can make informed economic decisions."

D.8.5; D.8.11

Wisconsin Teacher Standards which can be met with this curriculum, including rationale:

Standard 1: Subject matter. This curriculum provides suggestions to extend information on the topic, which will enhance the teacher's information about the subject matter.

Standard 3: Adapt instruction. The curriculum provides suggestions for learners with a variety of intelligences and levels of ability, particularly in the extended learning sections.

Standard 4: Instructional strategies. The curriculum includes the use of technology to gain information and suggestions for using research in extending learning.

Standard 5: Individual and group motivation. This curriculum involves cooperative learning, active learning, and prior knowledge.

Standard 6: Verbal and nonverbal communications. Instructional media and technology that promote active learning are key parts of this curriculum.

Standard 7: Organizes and plans systematic instruction. The curriculum is organized to support teacher knowledge, to draw on and motivate students to engage in active learning, and promotes active inquiry, collaboration, and supportive interaction in the classroom.

Standard 8: Formal and informal assessments. Suggestions for a variety of assessments, both formal and informal, are offered in the curriculum.

Standard 10: Fosters relationships. The curriculum provides information that could foster student relationships with science professionals. It also encourages students to think about the relationship between their personal environment and the needs of the general community; for example, the students might discover a wetlands restoration project that they could participate in.