CAVOC - GRADE 5

Suggested Schedule

8:30 – 8:45	Arrival, overview, expectations, rules, housekeeping, questions, break up into three groups.
8:45 – 9:45	Group 1
9:45 – 10:45	Group 2
10:45 – 11:45	Group 3
11:45 – 12:45	Lunch and lunch recess
12:45 – 1:45	Game – walk – speaker
1:45 – 2:00	Clean up and depart for school

Pond Study

Objectives

- Students will use a field guide to identify microorganisms from the pond.
- Students will draw and label body parts of microorganism.
- Students will explain use of body parts.

DPI Environmental Education Standards

A.8,5, C.8.2

School District of Rhinelander Benchmarks

S.5, A.2, S.5, C.3

Materials

Plastic trays for samples
Hand lens
Eyedroppers
Binocular and traditional microscopes
Pond Study Response sheets
Pond Field Guides

Approximate Time
60 minutes

Desired Location
At the ponds, collect samples, and then return to building.

Resources
Aquatic resource guides
Project Wild Aquatic, K-12 Curriculum & Activity Guide
WOW! The Wonders of Wetlands, Environmental Concern Inc.
Project Wet, Curriculum and Activity Guide, Council for Environmental Education

Background Information
(See the Grade 4 Pond Study unit. This unit is designed to be the next step in studying pond life.)

Ponds abound with life forms. This study focuses on the aquatic arthropods and microscopic organisms found in ponds in Northern Wisconsin. The goal is to find as many different organisms as possible to draw inferences on the health of the ecosystem. When possible scientific identification of the organism should be made but this is supplemental to the goal of discovering diversity.

Students need experience in collecting data and organizing the data to make conclusions. Their observations using the microscopes should emphasize details that allow identification using the guides provided. During the discussion of the activity, the emphasis should be on how we know what constitutes a healthy ecosystem.

Activity
1. Either (a) collect water/aquatic samples ahead of time and bring to the classroom or; (b) take students to one of the ponds and collect water/aquatic samples for use later in the classroom.
2. Return to classroom and distribute the samples into trays suitable for the size of the small groups. (3-4 students per group/tray)

3. Begin by looking/identifying the material/organisms that are in the trays. Make appropriate notes of what is found in the student response journal.
4. Collect examples of animals and look at them using hand lenses and the binocular microscopes.
5. Collect samples of water to look at under a high magnification microscope. Look for microscopic life forms.
6. When the different animal/life forms are found;
    a. Do drawings in the student response journals
    b. Make identifications using the guides provided
    c. Count the number of different living organisms found.
7. Select aquatic animals for additional study using the binocular microscopes.
    a. Make accurate drawings of the basic body parts of the animals
    b. Label the body parts
    c. Identify what the body part is used for, i.e. breathing; movement; gathering food
    d. Describe what stage of life the animal is in.
8. Discuss the finding of the activity.
    a. How many different animals were found? Identified?
    b. What characteristics were common among the animals?
    c. How did the microscopic organisms compare to those seen with the binocular microscope?
    d. Does the sample collected indicate a diverse collection of life?
    e. Does the sample indicate a healthy environment? Explain.

Tree Identification

Suggested Schedule

8:30 – 8:45	Arrival, overview, expectations, rules, housekeeping, questions, break up into three groups.
8:45 – 9:45	Group 1
9:45 – 10:45	Group 2
10:45 – 11:45	Group 3
11:45 – 12:45	Lunch and lunch recess
12:45 – 1:45	Game – walk – speaker
1:45 – 2:00	Clean up and depart for school

Objectives

- Students will use a dichotomous key to identify native trees.

DPI Environmental Education Standards

B.8.22, A.8.4, A.8.5

School District of Rhinelander Benchmarks

LA.5, A.3, S.5, C.2, S.5, C.3, S.5, G.3

Materials

Trees of Wisconsin Book
Clipboard and pencils
Papers
Paper Bags

Approximate Time

60 minutes

Desired Location
Wooded area and bog area

Resources
Project Learning Tree, Environmental Education Activity Guide, p.244-246, 1993
Ranger Rick's Naturescope, "Trees are Terrific!" National Wildlife Federation

Background Information
Tree species can be identified by looking at several different features; leaves, bark, twigs, flowers, fruits, and seeds. Even the overall shape of a tree can give clues to the tree's identity. In this activity, your students will learn more about trees by identifying features.

Needles or Broad Leaves
In the simplest sense, there are two kinds of trees in the world; conifers, or coniferous trees, and broad-leaf or deciduous trees. Conifers have seeds that develop inside cones. Pines, spruces, hemlocks, and firs are all examples of conifers. For the most part, conifers also have needle shaped leaves and they are evergreens. That means they do not lose all their leaves each year but instead stay green year-round. Deciduous trees such as oaks, maples, beeches, and aspens have broad, flat leaves. They lose all of their leaves each year. Some trees, however, are not typical conifers or deciduous trees. For example, tamaracks have cones and needles but lose their leaves every year, yew trees have needle-shaped leaves and are evergreens but have berries and not cones, and a holly is a broad-leaf tree that is evergreen.

The Shape of Things
The overall shape of a leaf gives clues to the tree's identity. For example, willows have long, slender leaves; cherry trees and swam magnolias have oval-shaped leaves; and cottonwoods have triangular-shaped leaves. Similarly, fir needles tend to be flat, pine needles are rounded, and spruce needles are squares. The shape of the leaves differ in many ways. For example, the tips of leaves may be notched, pointed, rounded, tapered, and so on. In addition, the bases of the leaves may be squared, rounded, heart shaped, and so on.

Margins

The edges or margins of leaves can also provide clues to the tree's identity. For example, some leaves have teeth (serrated) along their margins, some leaves are lobed, and some leaf margins are smooth.

Textures

Some leaves are completely hairy, others have hairs on only one side and others are completely smooth. Leaves may also be think or thin, rough or waxy.

Simple and Compound

When most people think of leaves, they think of simple leaves. Simple leaves have only one piece to them. Maple, oak, aspen, sycamore, and many other trees have simple leaves. Compound leaves, on the other hand, are made up of several leaflets. Ash, walnut, and sumac trees all have compound leaves.

Leaf Arrangements

Another characteristic to identify a tree is the way its leaves are arranged on the twigs. Many trees have alternate leaves that are staggered along the twig. Other trees have opposite leaves that grow in pairs along the twig. In addition, some leaves grow in whorls, or are whorled. The leaves on pines, spruces, firs, and other needle-leaved trees also grow in patterns. For example, leaves on pines may grow in cluster of two, three, or more..

Twiggy Clues

If you know what to look for, even leafless twigs on a tree can tell you the tree's identity. By looking at where the leaf scars or buds are on the twig, people can tell if the leaves grow in alternate, opposite, or whorled pattern. (Leaf scars are the places on the twigs where leaves used to be attached.) The size, color, and shape of buds can also be used to identify trees. Spines and thorns on twigs can also help identify a tree.

Fruit and Flowers

Different trees produce different kinds of fruit, such as berries, winged seeds, nuts, pods, or some other type of fruit. Different conifers produce different kinds of cones. Different trees also have different flowers. The shape, color, texture, size and other characteristics of fruit, cones and flowers can be used to identify trees.

Bark Basics

Many people can identify trees just by looking at the color and texture of tree bark. For instance, bark may be shaggy, smooth, or rough; it may have deep furrows or markings. Paper birch is an example of a tree easily identified by its white, paper-like bark. However, when using bark to identify a tree, it is best to look at bark growing on the trunk rather than on branches and twigs (because the bark on a branch is thinner and newer, it may look quite different from the trunk.) Bark also looks different as a tree gets older.

Shaping Up

Many trees have characteristic that can be used to identify them. In fact, just by glancing at the shape of a distant tree and the color of its leaves, some people can tell what kind of tree it is. For example, a palm tree has a very distinctive shape.

Activity

1. Collect about four examples of tree leaves.
2. Ask students what characteristics they might use to identify trees. As they give their ideas, ask how they could use these characteristics to identify trees.
3. Use the background information to discuss ways people identify trees. Be sure to go over leaf characteristics such as leaf bases and tips, leaf margins, simple and compound leaves, and alternate and opposite branding patterns.
4. Using the tree identification book, turn to page 54 and 55. Have the student become familiar with the conifers and deciduous trees and how to use the chart to identify trees.
5. Using the four samples you colleted, have students identify the leaf samples.
6. Take students outside to the first tree that you have chosen. Using leaf and tree characteristics have students use the books to identify the tree.
7. If you are going to have the students make leaf collections, have each student fold their tree identification paper and put their leaf sample inside the folded paper.

8. Continue to identify trees near the lodge, but be sure to save enough time to take them to the bog where they will be able to find some trees that live in a different environment.

Classroom Follow-up
The EEK! (Environmental Education for Kids) website www.dnr.state.wi.us/org/caer/ce/eek/veg/treekey/index/htm. Has a tree identification activity for students to use.

Read The Lorax or show the video.

Soil Sampling

Suggested Schedule

8:30 – 8:45	Arrival, overview, expectations, rules, housekeeping, questions, break up into three groups.
8:45 – 9:45	Group 1
9:45 – 10:45	Group 2
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11:45 – 12:45	Lunch and lunch recess
12:45 – 1:45	Game – walk – speaker
1:45 – 2:00	Clean up and depart for school

Objectives

- Students will observe differences in soil structure.
- Students will relate plant species to natural physical features.
- Students will transfer certain soil structure to use in landfills and septic systems.
- Students will observe different water capacities for different soils.

DPI Environmental Education Standards

A.8.1, A.8.2, A.8.4, A.8.5, B.8.10, B.8.17, B.8.23

Materials

- Soil collection tubes
- Clipboards
- Paper and crayons

Approximate Time

60 minutes

Desired Location

Ponds and low areas West of the lodge

Background Information

The soil that is beneath the ponds West of the lodge contain a clay liner, just like the newer landfills do. The clay liner is what holds the water in the pond. There are other areas around the pond that are seemingly as low or lower than the pond, that have no water. Long Lake is different from the ponds in that the lake is groundwater level showing.

The type of soil influences the types of plants that grow in various locations. Some tree species like sandy soil, such as white and red pine, while other tree species like a heavier soil, such as maples and oaks

Soil structure is important when constructing a septic system. The septic system needs soils that allow the water to filter out, but maintains some filtering of solids ability.

Activity

1. Introduce the activity by talking about soil structure and that different plants grow in different soil conditions, pine trees like sandy soil and maple trees like a heavier soil with more humus and clay. Explain that you are going to take some soil samples at different locations and examine the soil looking for differences.
2. Divide the students into four groups giving each group a soil collection tube and a piece of paper and crayons.
3. Go West out of the lodge down the road toward the Ropes Course. Take soil samples on some high ground just off the trail and examine the soil. Have the students talk about what the soil samples look like and ask them to feel it. Discuss water content. In that discussion talk about how some soils hold more water than other soils. Ask one group of students to draw a picture of the soil sample and color it as accurately as possible. Label the location of this drawing.
4. Take the trail where the sign "Upland Ponds" leads off to the right. Walk to the ponds, take soil samples here. The sample should have a different look and even feel to the soil. Have the students talk about what the soil sample looks like and ask them to feel it. Discuss water content. Compare it to the first sample. Discuss the clay and how the clay holds the water and does not allow it to seep into the ground. Ask the students how this knowledge of clay "holds" water has a transfer to landfills. Talk about how the newer landfills start with a clay liner

to prevent the contaminated water from the disposal of garbage to filter into the ground water. The clay liner "holds" the polluted water in. The newer landfills also put a "cap" on the landfill so that rainwater cannot penetrate into the garbage and thereby causing more water to be polluted and threatening the groundwater even more. With the clay cap in place the rain will run off the landfill. Ask one group of students to draw a picture of the soil sample and color it as accurately as possible. Label the location of this drawing.

5. From the pond turn South to another low area where there may or may not be water standing. Take another soil sample here. There is some clay here also, but not as much as the pond with the water standing. Discuss how this soil sample is different from the other two that you have examined. Ask one group to draw a picture of the soil sample and color it as accurately as possible. Label the location of this drawing.
6. Go to the first Rope Course structure a tall tower off on the right in a low area. Discuss how this area is even lower than the pond area. Take a soil sample here. Discuss how this soil sample is different from the other three that you have examined. Ask one group to draw a picture of the soil sample and color it as accurately as possible. Label the location of this drawing.
7. Go back to Rominsky Lodge and discuss your findings about the structure of soil. Conclude with a discussion of how septic systems are constructed using soil structure to prevent pollution.

Seed Collection

Suggested Schedule

8:30 – 8:45	Arrival, overview, expectations, rules, housekeeping, questions, break up into three groups.
8:45 – 9:45	Group 1
9:45 – 10:45	Group 2
10:45 – 11:45	Group 3
11:45 – 12:45	Lunch and lunch recess
12:45 – 1:45	Game – walk – speaker
1:45 – 2:00	Clean up and depart for school

Objectives

- Students will collect plant seeds
- Students will classify or sort plant seeds
- Students will identify varying methods of seed dispersal
- Students will model or design seeds that use varying methods of dispersal

DPI Environmental Standards

A.8.3-6, B.8.8

School District of Rhinelander Benchmarks

S.5.C.1,S.5.C.2

Materials

- Paper bags

Approximate Time

1 hour

Desired Location

Anywhere at CAVOC that students can find seeds.

Resources

Project Learning Tree

Background Information

Living organisms are made of systems that enable them to grow and reproduce. All living things have some system for reproducing members of their species. Most seed bearing plants have developed a way to disperse seeds away from the parent, giving the new plant a better chance to find what it needs to grow. Some plants produce very light seeds with sail-like or hairy outgrowths that enable them to be carried by the wind. For example, a maple seed had papery winds that flutter like a helicopter, while a dandelion seed has a fuzzy parachute that carries it on air currents. Some plants, like beech trees and Queen Anne's lace produce seeds with spines, hooks, or gooey coatings that catch on an animal's fur or people's clothing and are carried to distant places. Some plants, like black cherry trees and raspberries, develop seeds within an attractive, tasty fruit. Those seeds are eaten by animals, carried in the animals' digestive systems and deposited in a different location when the animal defecates. Still other plants like locust trees, violets, and witch hazel, have seeds that are ejected away from their parent plant. For example, witch hazel seeds develop within a pod that squeezes the seeds as the pod dries. When the seeds finally shoot out, they can travel up to 40 feet.

Activity

1. Ask student what seeds are and what they do. Tell students they are going to learn more about trees by collecting and sorting them.
2. Ask students to go out and collect as many seeds as they can around the lodge and within sight of the lodge.
3. Put all seeds into a class collection. Divide students into groups of two to five, and give each group an assortment of seeds from the collection. Ask groups to examine their seeds and invent a system for sorting or classifying. Invite students to share their methods for sorting.
4. Lead a discussion about the structure and function of seeds. Ask questions such as these.

- What are seeds?
- Where do seeds come from?
- Is there a reason for so many different kinds of seeds?

5. Ask students why it might be important for seeds to be dispersed away from parent plants. Invite students to share different ways they have noticed that plants disperse their seeds. Ask students whether any of the ways they have observed seem similar. For example, they might have said that dandelions blow in the wind and that milkweed floats in the air. Help students compile groups of similar dispersal systems so class ends with a set of about five to eight categories. There is no one right way to group the seeds. Use student examples to help them create their own categories.

6. Ask students to group their seeds according to the dispersal categories they identified.

7. Discuss these questions;

- How does a seed's shape and size affect its dispersal?
- What other parts of a plant help it reproduce? (Flowers that have male and female parts, and fleshy fruits that encase seeds)
- Why is it important for seeds to be dispersed in different ways? (Plants have different requirements and are served best by different seed dispersal systems.)

- How far can a seed be dispersed? (Seeds can glide on the wind for several miles, float on the water for hundreds of miles, or travel on a bird for thousands of miles.)
- Can some seeds go farther than others? (yes)
- How is distance important? (it reduces competition for a plant's needs in a particular area. Widespread plants increase the species' chances of survival.)
- What value might seed dispersal have for plants, wildlife and humans? (food, medicine)

<u>Categories of Seed Dispersal</u>

- Floats on air; milkweed, dandelion, cottonwood
- Flies through the air; maple, ash, tulip, popular
- Floats on water; mangrove, coconut, cranberry
- Bounces or rolls; acorn, pecan, black walnut
- Eaten by animals; cherry, apple
- Stored by animals; acorns, hickory, beech
- Thrown; locust, violet, witch hazel, lupine, jewelweed
- Sticks to animals; beard grass, burdock, cocklebur, foxtail, goldenrod, wild barley

<u>Classroom Follow-up</u>

1. Have students make a collection of seeds, labeling each seed and classify the seeds into dispersal systems. They need to display the seeds in some way.
2. Challenge students to design their own seeds with specialized dispersal mechanisms. The seed needs to:
    - Float in water for at least five minutes
    - Attract an animal to carry it away
    - Floats in air for at least five feet
    - Sticks to an animal and can be carried at least ten feet, or is thrown at least two feet away from parent plant.