CAVOC - GRADE 3

(Suggested schedule for the day for each grade level)

Activity: **Habitat Lap Sit**

Objectives: The students will:

- Identify the components of a habitat
- Recognize how humans and other animals depend upon habitats
- Interpret the significance of loss or change in habitat in terms of people and wildlife.

Environmental Standards:
A.4.2, A.4.3, A.4.4, B.4.4, B.4.5, C.4.1, C.4.4

Materials:
Laminated Role Cards

Location of Activity:
In playing field (lower level in case of rain)

Time;
20-30 minutes

Resource:
Project Wild: K-12 Curriculum and Activity Guide – 2000,

Pages - 61-63

Background:

People and other animals share some basic needs. Every animal needs a place in which to live. The environment in which an animal lives is called a habitat. An animal's habitat includes food, water, shelter and space in an arrangement appropriate to the animals needs.

An animal will be affected if any of the components of habitat are missing or are significantly affected so that the arrangement for the individual animal or population of animals is no longer suitable. The impact will not necessarily be catastrophic, but it can be. There are additional limiting factors beyond those of suitable food, water, shelter and space. For example, disease, predation, pollution and climatic conditions can affect an animal's survival.

Within a biological community, there are interrelationships and interdependencies between plants and plants, plants and animals, as well as animals and animals. These interrelationships and interdependencies are important.

Playing the Game

1. Have the students form a circle, holding hands. Walk around the circle, first naming one student as an animal of a particular habitat. Name the next four students in the circle as food, water, shelter and space for that animal. Repeat the process until all the students are involved.
2. Comment on the fact that they are holding hands. This arrangement represents the idea that all things in a habitat are interrelated. Briefly, discuss the idea of interrelationships.
3. Ask the students to turn toward their right, at the same time taking one step toward the center of the circle. They should be standing close together, with each student looking at the back of the head of the student in front of him or her.
4. Ask everyone to listen carefully. Students should place their hands on the shoulders of the person in front of them. At the count of three, ask the students to sit down slowly on their knees of the person behind them, keeping their own knees together to support the person in front of them. As the students are sitting say, "Food, water, shelter and space in proper arrangement are needed to have a suitable (good) habitat." This "proper" arrangement is represented by the order of the students and their designated roles in the intact, lab-sit circle.
5. The students at this point may either fall or sit down. Discuss with the students the necessary components of suitable habitats for people and wildlife.
6. After the students have a better understanding that food, water, shelter and space are necessary for any animal survival, and that the appropriate arrangement comprises a suitable habitat, let the students try the activity again. This time ask them to hold their lap-sit posture. As the students, lap-sit still representing food, water, shelter and space in their appropriate arrangement-identify a student who represents water. Tell the students, "It is a drought year. The water supply is reduced by the drought conditions:
7. At this point, have the student who was identified as representing water remove him or her from the lap-sit circle. At that point, the circle will either collapse or suffer some other disruption.

8. Think about what other events might happen that would make the circle collapse and try it again with that scenario. (Pollution, hard winter, little food, destruction of habitat).
9. After falling down for the last time, gather and discuss what this activity means to them. Ask them to summarize the main things they have learned. They could include:
    - Food, water, shelter and space, in an appropriate arrangement, can be called habitat.
    - Humans and other animals depend upon habitat
    - Loss of any of these elements of habitat influence the animals living there.
    - The components of habitat must be in an arrangement that meets the needs of the individual animals or populations of animals in order for the animals to survive.

<u>Note: (Environment Awareness)</u>

In your final discussion, discuss the positive and negative impacts that humans may have on the habitat of animals.

- Habitat destruction
- Wildlife management
- Water use

Emphasize that we need to always be mindful of our impact on the real habitat circle or animals in the future may not survive.

<u>Aquatic Extension:</u>

This can also be played using aquatic animals as examples and following the same sequence.

Activity: **Wetland Metaphors**

Objectives: The students will:

- Describe the characteristics of wetlands
- Demonstrate their understanding of the importance of wetlands to wildlife and humans.

Environmental Standards:
A.4.1, B.4.6, C.4.1, C.4.2, C.4.3, D.4.5 (Extension Activity) D.4, 2, D.4.3, D.4.4
Benchmarks:
LA.3B.2 (Extension Activity) S.3, C.1, S.3, F.4, S.3, H.2

Materials:

- Box or bag
- Sponge - Soap
- Small pillow
- Eggbeater
- Small doll cradle
- Paper coffee filter
- Antacid tablets
- Small box of cereal
- Pictures of a zoo (to show diversity), lush vegetable garden (to show productive wetland in which food is abundant) a vacation resort (to show resting or wintering place for migrating waterfowl).

Time: Approximately 45 minutes

Location: Widened area of the wooden bog walk. The dock area of the bog lake

Resource: Aquatic Project Wild – 1987 – Pages 49-52

Background Information

Wetlands are many different things to many different people. Some people have never heard or thought about wetlands. Others are working actively to protect wetlands because of their importance.

Wetlands include areas like freshwater and saltwater marshes, wet meadows, swamps, lagoons, bogs, and prairie potholes. All wetlands, whether coastal or inland, provide special habitats that serve areas far beyond their boundaries. Wetlands are uniquely important to plants, animals, humans, and total environment.

Because of the abundance of food, vegetative cover (shelter), and water found there, most wetlands are rich with diverse wildlife species. Coastal and inland marshes, for example, provide breeding, resting and wintering habitats for thousands of migratory birds-including ducks, geese, swans, cranes and shore birds. Many species of fish that are important for commercial and personal use by humans reproduce and spend apart, or all, of their life cycle in fertile wetlands adjacent to larger, more open bodies of water. These fish species include bass, salmon, walleye, perch and pickerel. A wide variety of reptiles, amphibians, insects and crustaceans also breed and live in wetlands. Frogs and toads, turtles of all kinds, salamanders, snakes, dragonflies, water striders, clams, and crayfish flourish in wetland habitats. Many mammals- from muskrats and beaver to whitetail deer and moose-also depend on wetland areas. Wetlands are often referred to as "nurseries" because they provide critical breeding and rearing habitats for countless numbers and kinds of wildlife.

Wetlands also have the unique ability to purify the environment. They act as natural filtering systems and have been shown to be extremely effective: for example, they can trap and neutralize sewage waste, allow silt to settle and promote the decomposition of many toxic substances.

The importance of vegetation associated with wetlands cannot be overlooked. Plants absorb nutrients and help cycle them through the food webs. Plants also help keep nutrient concentration from teaching toxic levels. Plants slow down water flow causing silt to settle out. Through

photosynthesis, plants add oxygen to the system and provide food to other life forms.

Of great importance to humans are the flood control characteristics of wetlands. When runoff from rains and spring thaws is high, wetland area absorb excess water until it gradually drains away down streams and rivers and through the soil. Acting as buffers, healthy wetlands prevent flooding and erosion. In dryer periods, wetlands hold precious moisture after open bodies of water have disappeared.

The many activities that take place in the wetlands make them among the most productive eco systems in the world.

As remarkable and resilient as wetlands are these unique areas have limits. Their destruction and/or abuse can have devastating effects on wildlife, humans, and overall environmental quality.

Procedure

Object	Metaphoric Function
Sponge	Absorb excess water caused by runoff; retains moisture for a time if standing water dries up (e.g., sponge placed in a small puddle of water absorbs water until saturated, then stays we after standing water has evaporated)
Pillow or bed	Is a resting place for migratory birds
Mixer or egg beater	Mixes nutrients and oxygen into the water.
Cradle	Provides a nursery that shelters, protects, and feeds young wildlife.
Sieve or strainer	Strains silt, debris, etc., from the water
Filter	Filters smaller impurities from water
Antacid	Neutralizes toxic substances
Cereal	Provides nutrient rich foods
Soap	Helps cleanse the environment as wetlands do.

1. Prepare a "Mystery Metaphor Container" (Box with items will be available).
2. Discuss the variety of wetlands found in your local area, state, country, etc. Invite the students to sit quietly and close their eyes. Ask them to imagine and visualize a wetland. Have them examine what it looks like. Have them look carefully at the plants and animals, including insects and small creatures. What does the air feel like? How does it smell?
3. Talk briefly, about what they imagined.
4. Show the students pictures of plans and animals that are actually found in a wetland.
5. Provide the students with background information to serve as an overview of the basic ecological activities that characterizes the wetland habitat. For example, you can include the following.
    - Sponge effect-absorbs runoff
    - Filter effect-takes out silt, toxins, wastes, etc.
    - Nutrient control-absorbs nutrients from fertilizers and other sources that may cause contamination downstream

- Natural nursery-provides protection and nourishment for newborn wildlife.

6. Bring out the "Mystery Metaphor Container." Tell the students that everything in the container has something to do with a wetland.
7. Have a student reach into the container and withdraw one object. Discuss what the relationship is between their object and the wetland. Take turns pulling out and discussing objects.
8. Walk to the bog area to observe the plants, sounds, animals and smells.
9. While at the bog site or back on dry land in a circle use the following ground discussion questions.
   - What are the major roles that wetlands perform in creating habitat for wildlife?
   - What ways are wetlands important to humans?
   - Why do humans change wetlands to other uses?
   - Have your ideas of the importance of a wetland changed?
10. Encourage the students understanding of how the wetlands conditions depends on each of us. Many kinds of wildlife depend upon wetlands. Our own well-being requires wetlands ecosystems. Strengthen the students' understanding of the connectedness that humans have to wetlands. Recreations, aesthetics, utilitarian uses, environmental quality, and nature study are but a few of the connections we each have with wetlands.

Extension:

- Have students write letters or make posters in support of wetland importance and protection.
- Visit the National Wildlife Federation Website to learn more and voice your opinion about wetland preservation. National Wildlife Federation NWF@ProcessRequest.com

Activity: **Food Chain Game**

Understanding the concepts presented in this game will help students recognize how energy flows through communities. It also helps students appreciate that the world around them depends on a continuous supply of energy.

Objectives: The students' will:

- Draw a simple food chain or web
- Explain why energy is lost at each successive link in a food chain
- Diagram how energy flows and how nutrients cycle in a food chain

Environmental Standards:
A.4.1, A.4.2, A.4.3, A.4.4, B.4.1

Materials:

- A plastic hamburger
- Cones or other objects to mark the playing field boundaries
- Two to three large bags of white popcorn
- Portable flipchart and marking pen

Time: 50 minutes

Location: Playing field

Resources: KEEP Activity Guide (Available from Chris Young or Genene Lynott)

Pages N37-N41

Background Information

"Hey, what's for dinner?"
"Sunshine"
"Sunshine?"
"Yes, sunshine."
Almost everything you eat can be traced back through food chains to the sun. A food chain consists of a series of organisms in which the first organism is eaten by a second and the second is eaten by a third. During this process, nutrients and stored energy is the eaten organism are transferred to the organism that eats it.

Most of the food we eat comes from simple food chains derived from human-controlled agricultural ecosystems. For example, the beef we eat comes from a cot that ate corn. The corn received its energy from the sun. However, in natural ecosystems, a hawk may eat a snake that may have received its energy from a mouse, a frog or a rabbit. If it ate a mouse, that mouse may have consumed seeds from any number of plants. None of these food chains is exactly alike.

The food chain begins with producers, organisms such as green plants that can make their own food. Through photosynthesis, producers convert solar energy to chemical energy-energy stored in the chemical bonds of the food. Of all the energy, a plant receives from the sun; only about three percent is converted into chemical energy. (The amount of chemical energy varies depending on the plant species and the location of the plant).

Plants are eaten by consumers, which are organisms that cannot make their own food. Herbivores are consumers that eat only producers. Consumers that prey on other consumers are called carnivores. If an animal can get its energy by ingesting either producers or consumers, it is an omnivore.

A food chain does not consist of a set amount of organic matter and stored energy being passed along like a baton from one organism to another. In reality, the baton gets smaller and smaller with each transfer. When an herbivore eats a plant, it does not get all the energy that the plant received from the sun. This decrease is because the herbivore may not eat all parts of the plant, and it may not be able to digest what it does eat. These

undigested plant parts are excreted as waste. The same holds true for other organisms along the food chain.

Another reason why energy obtained by one organism is not passed on in the food chain is that it is no longer available. Some energy has already been used by the first organism. A plant used some of the energy it receives to grow and function. An herbivore uses its energy to grow, but also look for food and escape predators. A predator uses large amounts of energy to chase after its food in addition to its regular life processes breathing, digesting food, moving. The energy these organisms use eventually leaves their bodies in the form of heat.

The amount of energy this is transferred from one organism to the next varies in different food chains. Generally, about ten percent of the energy from one level of a food chain makes it to the next. Because energy is lost with each successive link, there must be enough stored energy in the organisms to allow for this loss and still have enough energy remaining for the consumers in the next level. In other words, the total biomass (organic matter) of the producers must be greater than the total biomass of the herbivores they support, and the total biomass of the herbivores must be greater than that of the carnivores. Because of this energy loss, there are usually more producers those herbivores, and more herbivores than carnivores in an ecosystem.

What happens to the massive amount of organic material (a stored energy) that is unconsumed or undigested? Decomposers such as bacteria and fungi, and small animals such as ants and worms, eat nonliving organic matter. Decomposers cycle nutrients back into food chains and the remaining stored energy in unconsumed matter is used and eventually dissipated as heat. Therefore, decomposers are an integral component of all ecosystems.

Food chains cycle nutrients within an ecosystem and provide the mechanism for energy to flow through the ecosystem. In natural ecosystems, these food chains have any alternate routes through which energy can flow, creating integrated, complex food webs. Through agriculture, humans have simplified food chains so the energy flow is more direct. It is very easy to trace almost anything you eat back to its original source of energy; the sun. So, what's for dinner? The sun, of course!

Procedure

Orientation:
Share the following scenario with the students:

Mr. Smith is driving to work for the first time. Along the way, there are four tollbooths. At each tollbooth, he must pay 50 cents. He only has one dollar in change. Therefore, he is able to make it through only two tollbooths before calling his wife to bring him more money. Mr. Smith knows that from now on he must make sure he has enough money at the beginning of the day so that he can make it to and from his workplace.

Tell the students that this scenario presents a simple budget that Mr. Smith had to develop. Explain that nature has budgets too, but instead of enough money, there needs to be enough energy. Ask students where humans get energy to grow and to function. They should know that our energy comes from food. Show the students the hamburger in the sandwich bag. Challenge students to trace each food item in the sandwich bag to the sun. Discuss how energy is being transferred from one organism to another and how each organism uses the energy it received. Share the definition of a food chain (background information). Review the process of photosynthesis, stressing how plants are able to convert the sun's energy into chemical energy (stored energy in food). Tell students that they will be playing a game that simulates energy transfer in a food chain. **They should also remember the analogy of the budget; they may need it to make the game successful.**

Steps:

1. Ask the students to list a simple food chain found in nature. Limit the organism in the chain to a **producer, a primary consumer** (herbivore), and **secondary consumer** (carnivore), **an example is acorn > chipmunk > fox.**
2. Take the group outside and show them the small cups. Tell students the cups represent the producer-corn-in the food chain. Count out one cup for every two students in the class. Randomly place these cups throughout the playing field.
3. Point out the large bag of popcorn and indicate that it represents energy from the sun. Walk around to each plant and pour "sunlight"

into each cup. Be sloppy when you pour, allowing popcorn to spill around the cup, and do not try to fill the cups completely. Since the popcorn in the cups represents energy plants converted to make food, as students, "What does the spilled popcorn represent?" Students should suggest that the popcorn is sunlight that missed the plant or that the popcorn is energy that the plant did not convert. Tell students that plants are able to use about 3 percent of the solar energy they receive to make food.

4. Divide the group into two equal groups. One group represents the herbivores-mice-and the other, carnivores-hawks. Put up the Organism Tally Chart. Under Round 1, record the number of producers (small cups) in the playing field and the number of herbivores and carnivores.
5. Give the herbivores the medium-size cups and the carnivores the large cups. The cup represents the organisms' food needs. Students' cups should be at least half filled with popcorn for the organism they represent to survive. Ask students whey the carnivores' cups are bigger than the herbivores'. Discuss things, such as energy, needed to hunt food.
6. Discuss the rules of the game. The purpose is for the consumer to get enough energy (popcorn) to survive.

<u>Game Rules</u>

- The herbivores start at one end of the playing field and the carnivores at the other.
- When the game begins, the herbivores go to the plants, take the energy (popcorn) from the plant and put it in their cups. They can only take popcorn that is in the cup. Taking the popcorn means that they ate the plant. They are trying to fill their cups to get enough energy to survive (1/2 cup).
- At the same time, the carnivores try to tag the herbivores. They can only get popcorn from herbivores.
- Tagged herbivores empty their popcorn into the carnivores' cups and leave the game.

7. Each game should last about one or two minutes. Record the number of producers, herbivores, and carnivores that survived (students with at least half filled).

8. Point out that many organisms were not able to survive because there wasn't enough energy. Help students identify reasons for insufficient energy.
    - Not enough energy (popcorn) available to the beginning of the food chain (two few producers to convert solar energy to energy in food)
    - Loss of energy by organisms (popcorn spilling out of their cups) when running around trying to get food.

Remind the class that it takes energy to get energy and organisms use energy for other life process. This energy eventually leaves the organism in the form or heat and is available to the next organism in the food chain.

9. Discuss what changes to the game would have to be made to make the food chain more sustainable. Help students understand that because energy is lost at each link of the food chain, there needs to be enough energy at the beginning so that there is still enough energy remaining in the system after the necessary losses. Remind students of the budget scenario presented in the Orientation emphasize that reducing the loss of energy at each link is not possible because animals can only digest certain portions of what they eat and they must use energy to get energy.
10. Students should conclude that there must be more producers than primary consumers, and more primary consumers than secondary consumers. Ask students how many plant (small cups) primary consumers and secondary consumers there should be at the beginning of the game. Record their suggestion in the chart under "Round 2 and beginning". Add cups and arrange students accordingly.
11. Prepare for the next round by pouring more "sunshine into the cups. Make sure students understand that plants only get their energy from the sun. Once energy passes through a food chain, it is lost as heat and cannot be reused.
12. Play the game a second time to see if students' suggested energy budget allows for a more sustainable ecosystem. Record the number of survivors at the end of the round. If necessary make adjustments and play again.

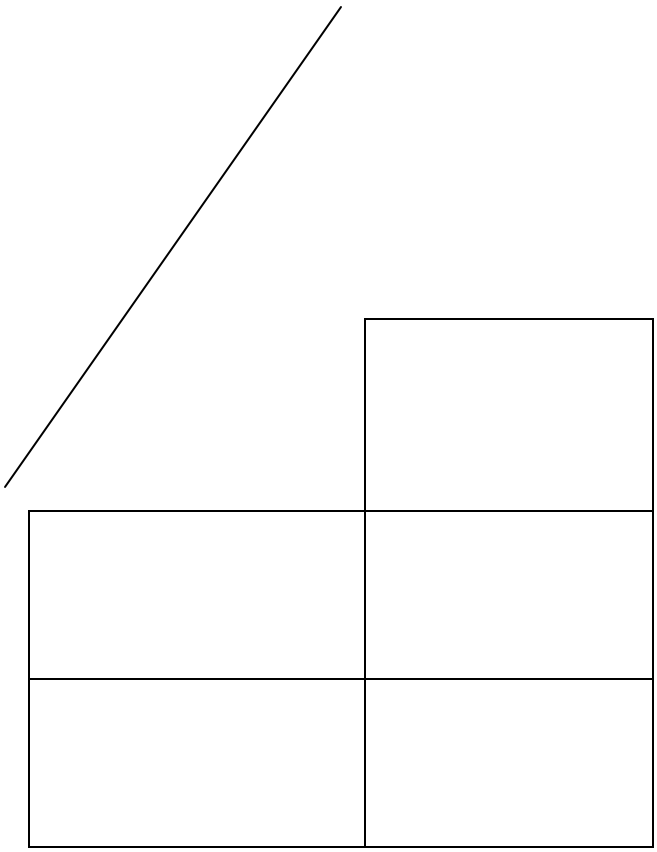
Closure

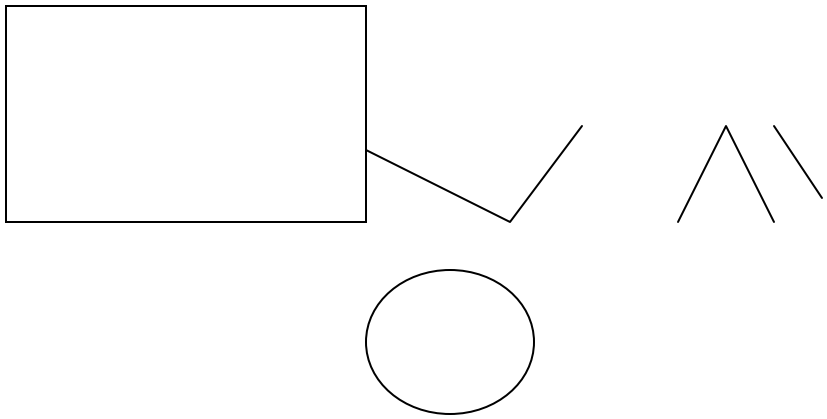
After the game, discuss the simple food chain used during the game (acorn>chipmunk>fox). Discuss the number of producers, primary consumers (herbivores), and secondary consumers (carnivores) that worked best to achieve a sustainable ecosystem. Ask students how to adjust the laminated diagram to be more representative of energy transfer in real ecosystems. For example, what other organisms eat corn? What else do hawks eat besides mice? Have students suggest additions to the food chain, creating a food web. Make sure the students note the many paths energy can travel in an ecosystem. Ask students what important component should be added to this food web to further complete it. Write the word decomposers along the bottom of the food chain diagram. Draw arrows from the entire organism in the food web to the decomposers. Emphasize those organisms throughout the food chain use energy. For living organisms to use energy, the fuel (stored energy in food) is burned, and the energy ultimately leaves an ecosystem in the form of heat. Students can tough their arm to feel this.

Assessment

Have the students fill in the Food Chain Energy Pyramid showing that there are more producers than herbivores, and more herbivores than carnivores. Emphasize that the size of the pyramid level represents stored energy that is available within that level.

Food Chain Energy Pyramid





Activity – **The Fallen Log**

Objectives: The students will:

- Identify some of the organisms that live in, on, and under fallen logs and explain how those organisms depend on the dead wood for survival.
- Describe the process of decomposition.

Environmental Standards:
A.4.1, A.4.2, A.4.3, A.4.4, B.4.4, B.4.6

Benchmarks:
S.3, C.4, S.3, C.6, S.3, F.4

Materials:

- Containers with lid – plastic tubs or plastic baggies
- Data sheets and pencils
- Clipboards
- Field guides for leader – optional to identify plants and insects
- Hand lenses

Time: 45 minutes

Location: - Woods around the lodge and the outdoor shelter.

Resources: Project Learning Tree Environmental Education Activity Guide – 1995

Pages 72-74

Background Information

Throughout their lives, trees collect nutrients from the environment and use them to build new bark, wood, branches, leaves and so on. When a tree dies, its **nutrients** are recycled back into the environment through **decomposition**. Animals, such as bark beetles, move into trees and start the process of decomposition even before a tree has died. These creatures may hasten the death of the tree. Wood-eating insects, as well as **fungi** and **bacteria**, invade a dead or dying tree, paving the way for other invaders. Here are some of the things your students may find, in and around dead wood.

Things growing on Dead Wood

Any decaying wood is sure to have fungi, moss, lichens and other plants growing on it. Wildflower, tree, and other plant seeds that land on a soft, decomposed log may also sprout and grow. Plants and fungi absorb nutrients from the decaying wood, and as they grow, they penetrate the wood and break it apart. Lichens, as they grow, release a weak acid that breaks down the wood. Moss keeps the log moist, making it a suitable place for other plants and animals to live.

Wood Munchers

Termites, sow bugs, carpenter ants, and wood roaches are all examples of creatures that eat or tunnel through wood. Many of those animals also eat other kinds of vegetable matter, such as dead leaves. As all of them chew their way through the wood, they help break down the log.

Predators on the Prowl

Some animals, such as centipedes and spiders, feed on the sow bugs, millipedes, and other scavengers that feed on the decaying log. The predators and then the scavengers in turn become meals for birds, skunks, and other animals that tear into a log to find food.

Hideouts and Nurseries

Many creatures depend on decaying logs as places to hide from predators or to find shelter from the elements. Patent leather beetles, click beetles, and other animals may spend the winter inside a rotting log. Some beetles, wasps, slugs, and other animals lay their eggs in decomposing wood. Salamanders may wait in the relative coolness and dampness of a fallen log during the day and then hunt for food at night. As these animals burrow into the log, they also help to break it down.

Procedure

1. Begin by asking the students why forests aren't piled high with fallen trees, branches and leaves. What happens to trees after they die? Tell the students that they're going to examine dead logs to find answers to those questions.

2. Tell the students that you are going to take a short walk to look for three examples of decomposing logs. Group members will be responsible for keeping track of different kinds of plant or animal found, where it was found, what it looked like, and what it was doing.

3. Begin the walk and when you find your first log explain that the students should disturb their log as little as possible while they examine it. They should put any creatures they find into their containers only briefly for examination. Students must return the creatures to the places where they were found as quickly as possible. If students can't identify animals or plants in the field, they can make sketches to take back to school. They should make sure the log is in its original position when they finish. You may also want to establish rules such as "don't stick your fingers into holes" and "Don't go beyond a certain point." Note: This is planned for a group of 10-12 students. You may want to divide this group into three teams, one for each log. Each team would be responsible for the record keeping, examination and identification for their log. The others would sit near the log and the team could share their findings with them at that point. You could also have each team working at the same time on their own log if they were located close to each other.

4. When they've finished examining their logs, have your students examine areas around each log. They might look in leaf litter, under rocks, around bases of trees, and so on.

5. Gather in the shelter after and use the discussion guide to talk about findings.

6. To access understanding tell them that a tree in the forest has just blown over during a terrible storm. Have them draw a series of pictures that shows what will happen to that tree over many years.

What to look for:

- Little living on their tree
- Many things growing on it or living in it, so less of the tree shows.
- Finally, a picture of only a small hump of material as a young tree growing where the decomposing log once was.

Extension:

Story "In the Forest of S.T. Shrew"
Project Learning Tree Environmental Education Activity Guide
1995
Pages 22-23

The Fallen Log Data Sheet

Is there bark on the log?	
If so, what is the condition of the bark?	
What kinds of plants are growing on the log? (Look for young trees, flowers, moss, fungi, slime molds and lichen).	
What kinds of animals are on the bark?	
What kinds of animals are under the bark?	
What do the animals you found appear to be doing?	
Predict what each one eats? What makes you think so?	
What evidence of animal activity do you see on or around the log? (Look for insect holes, spider webs, woodpecker holes, animal dens, animal tracks, piles of sawdust, or patterns in the wood under the bark).	
Has the tree been dead for a long or short time?	

The Life and Death of a Tree

1.	2.

3.	4.

The Fallen Log Group Discussion Questions

- What similarities and differences were there between each of the logs? What might explain the differences?
- Which animals and plants were found both on the log and in nearby areas, such as leaf litter?
- What do those areas and the log have in common?
- How do the animals you found in the log interact with it? (The log provided habitat-shelter, food, a place to raise young, and space to live in.
- Why is it important that logs like the ones we studied decompose? (Decomposition recycles the nutrients stored in the log).
- How does the forest ecosystem benefit from a fallen log? (The log provides a habitat for plants and animals that are, in turn, food for other creatures. As animals and plants break down the log, its stored nutrients become available for other plants and animals.