

Forest Ecology

Class Overview

1. Introduction
 - a. Ask the students to go around the circle and give their name and one thing they can find in the forest.
 - b. What are some examples of living things in the forest? What about non-living things in the forest?
2. Progression of Activities
 - a. Who Am I
 - b. Web of Life
 - c. Oh Deer
 - d. Camouflage
 - e. Fallen Log
3. Learning Standards Addressed
 - a. 4.A.2b , 4.A.2c, 4.A.3a 4.A.3c , 4.A.3d
 - b. 10.A.2a ,10.A.2c ,10.A.3c
 - c. 11.A.2b , 11.A.2d , 11.A.3f
 - d. 12.A.2a , 12.B.2a , 12.B.2b , 12.B.3a , 12.B.3b
 - e. 13.B.2e , 13.B.2f , 13.B.3d 13.B.3e
 - f. 19.C.2a ,19.C.3a
 - g. 21.A.2a , 21.A.2b , 21.A.3a
4. Vocabulary
 - a. Ecosystem: A community of living and non-living things and the interactions between them.
 - b. Interdependence: A dynamic of being mutually and physically responsible to and sharing a common set of principles with others.
 - c. Interrelationship: A logical or natural association between two or more things.
 - d. Limiting Factor: A factor that controls a process, such as organism growth, species population size or distribution.
 - e. Carrying Capacity: The population size of the species that the environment can sustain in the long-term, given the food, habitat, water and other necessities available in the environment.
 - f. Habitat: The natural environment in which an organism lives, or the physical environment that surrounds (influences and is utilized by) a species population.
 - g. Camouflage: Blending in with one's environment.
 - h. Predator: An organism that lives by preying on (killing) other organisms.
 - i. Prey: An animal hunted or seized for food.
 - j. Adaptation: An alteration in the structure or function of an organism to help them survive and multiply in their environment.

- k. Microhabitat: A very small, specialized habitat, such as a clump of grass or a space between rocks.
 - l. Decomposers: An organism, usually a bacterium or fungus that breaks down the cells of dead plants and animals into simpler substances.
 - m. Fungi: Plantlike organisms lacking chlorophyll , such as mushrooms, molds, yeasts, and mildews.
5. Wrap-Up
- a. What is an ecosystem? What are some living and non-living things we saw in the forest today?
 - b. What are some examples of limiting factors?
 - c. Describe how everything in the forest is connected.

Who Am I?

Objective: Students will be able to name many different types of animals that are found in Illinois, as well as other parts of an ecosystem.

Method: Students use deductive questioning to figure out what ecosystem component they are.

Location: Any area that allows mingling

Time: 15- 20 minutes

Materials: One “Who Am I” card for each student

Vocabulary: Ecosystem

Background Info: This activity should be done at the beginning of a class. It will give students an opportunity to explore all different types of living and non-living things found in an ecosystem. Before the class begins, pick out one object for each student, making sure to include items like the sun, trees, and water.

Procedure:

1. Before the activity begins talk about ecosystems. Have the students give examples of living and non-living things they can find in nature.
2. Place a “Who Am I” card on each student’s back, so they cannot see what object they are.
3. To figure out what object is on their card, the students must ask other students “Yes” or “No” questions.
4. Before they can begin, the students need to understand that they should not tell each other what their object is.
5. When students have correctly figured out what object is on their card, they can turn the card around so they can read it. They should continue to answer questions for the other students.
6. If a student is having a difficult time, try to help them by going through questions with them and reviewing what they already know about the object and give them some clues.

Wrap Up:

1. Once all the students know what object they are, have each student share a couple of facts about their object with the group.
2. Discuss the following: “How did you figure out what object was yours? What questions did you ask that helped you narrow down the possibilities?”

Web of Life

Objective: Students show a connection between living and non-living organisms in an ecosystem.

Method: Students pass a ball of yarn around a circle, creating a web that shows the connections between different factors in an ecosystem.

Location: Anywhere (inside or outdoors)

Time: 25 minutes

Materials: “Who Am I” cards from first activity

Vocabulary: Interdependence, interrelationship, ecosystem

Background Info: All things in a community are connected. No living organism is completely self-reliant. Trees need sunlight and carbon dioxide to make food. We need trees for the oxygen they produce plus all the materials we can create from trees. When a tree dies, decomposers break down its nutrients and return them to the soil. New plants and trees can grow from those nutrients. These are examples of interdependence and interrelationships.

Procedure:

1. Students should keep the same cards from the “Who Am I” activity with the picture facing outward for everyone to see and should stand or sit in a circle.
2. The students are going to connect with each other by passing the ball of yarn around the circle. The yarn can start anywhere in the circle. The first person will pass the yarn to another student in the circle that their card is directly connected to or dependent upon, saying what the connection is. The sun might pass the yarn to the trees saying, “Trees directly need sun for photosynthesis”. The tree then might pass the yarn to the oxygen because trees produce oxygen as a by-product.
3. Every time the students pass the ball of yarn, they need to keep the loose end of the yarn in their hands. After the yarn has been passed around to all the students, they can visualize the web and connections they have made.
4. Now tell the students that a tree has fallen. The student who is a tree must now tug on each string he/she is holding. Ask, “Who felt a tug on the yarn?” Each student who has felt a tug must now tug on each string they are holding, continuing this process until everyone is tugging on their strings. This will show how everyone is connected to each other in some way.

Wrap Up:

1. Discuss how important each individual factor is to the community. What would happen if you took one component away? What can kill a tree? (Loggers cut it down or fire destroys it.) Ask students various questions to get them thinking about the idea of community. If you could be one of these factors what would you be? Why?
2. Can you take something away?
3. Which component is the least important? Most important?

Adapted from: Cornell, Joseph, 1979. Sharing Nature with Children. Dawn Publications.

Oh Deer

Objective: Students will be able to identify components of habitat (food, water, shelter, and space), describe factors that influence carrying capacity, define limiting factors, and give examples that demonstrate an understanding of the natural fluctuations in wildlife populations.

Method: Students become deer and habitat components in a physical activity.

Location: An open field or area

Time: 20 to 30 minutes

Materials: Dry erase markers, chart to keep track of #'s of deer and graph to show population change

Vocabulary: limiting factor, carrying capacity, population, and habitat

Background Info: Carrying capacity is the dynamic balance between the availability of habitat components and the number of animals a habitat can support. Food, water, shelter, and space in a suitable arrangement are all factors that can affect the carrying capacity of an area for a certain population. Wildlife populations do not stay the same; their numbers fluctuate over time. Some examples of naturally caused and human induced limiting factors to a population are disease, predator / prey relationship, weather conditions (early freezing, heavy snow, flooding, drought), accidents, environmental pollution, and habitat destruction. An excess of these limiting factors can lead to threatening, endangering, and eliminating whole species of animals.

Procedure:

1. Count the students off by fours. All the ones should stand together in one group, while the twos, threes, and fours stand in another group. The two opposing groups will line up across an area facing each other.
2. Ones become the "deer". For a deer to survive it needs a good habitat. All good habitats contain certain components. Have the students tell you what habitat components a deer needs to survive (food, water, shelter, and space). Even though space is very important, during this game deer are going to only be looking for food, water, and shelter.
3. Before each round, each deer will decide what habitat component he or she is going to need and will show it by using certain hand symbols. To show that they are looking for water, they will put their "hooves" over their mouths. While looking for food, deer will put their "hooves" over their stomachs. When looking for shelter, they will put their "hooves" over their head. Each deer must display the symbol at the start of the round, and cannot change during an individual round. (They can change what they are from round to round.)
4. Twos, threes, and fours are the habitat components the deer are searching for. Students decide before each round if they want to be food, water, or shelter. They also depict what component they are using the same hand symbols the deer use (hands over stomach for food, hands over mouth for water, and hands above head for shelter).
5. The activity begins with the two lines turning around and facing the opposite directions from each other. Individuals in the habitat group decide if they are food, water, or shelter; and the each deer decides what habitat component he or she is trying to find.

6. When both groups are ready and have their symbols clearly showing, say “Oh Deer,” which means everyone should turn around to show their “symbols”.
7. When both groups are facing each other, the deer will run/walk across the area and pick one habitat component that is showing the same symbol as they are trying to find. If a deer is able to find what it needs, then the deer and the habitat component will go back to the deer side. If the deer is unable to find what it needs, then it will not be able to survive, and it becomes a habitat component.
8. After each round, keep track of how many deer there are on the enclosed chart. Each round stands for a year. On the back of the chart is a graph to show the change of population from year to year during the wrap-up.
9. A possible extension that can be done is to simulate complete loss of a particular habitat component. For example a drought year can be simulated by having the habitat components be only shelter or food. Any deer looking for water will die from the “drought.” A lack of food or shelter could indicate a human induced

Wrap Up:

1. Show the students the graph of the deer populations’ change over the years, or have different students graph the population for you. What caused the population to change? Why were the deer unable to survive certain years?
2. Why did the deer population grow other years?
3. When did our population of deer exceed the carrying capacity? What were the factors that limited our population? What are other factors that could have limited our population?
4. What are natural factors? What are unnatural factors?

Adapted from: 2004. Project Wild. Council for Environmental Education.

Camouflage

Objective: Students will be able to discuss how and why animals use camouflage.

Method: Students will become prey and try to hide from the predator by using camouflage.

Location: The game can be played in many different places in the forest (somewhere with lots of places to hide, an open field). Make sure the area is safe because the students will run during this game. When playing during warmer seasons, areas where there is an abundance of poison ivy or stinging nettle should be avoided.

Time: 10-15 minutes per round

Materials: None

Vocabulary: Camouflage, predator, prey, adaptation

Background Info: One kind of adaptation that aids in some animal's survival is camouflage. Camouflage allows animals to blend into their environment so they aren't easily seen by predators or prey. For example, some insect species that live on trees closely resemble the leaves or bark of their host species. A very still walking stick blends in perfectly when resting on a shrub. Some animals even have the ability to change their color depending on the season. Snowshoe hares are white in the winter and brown in the summer. However, camouflage is not just for prey. Camouflage allows predators want to be able to get as close to their prey as possible without being seen or heard.

Procedure:

1. At the beginning of the activity pick one student to be the predator (i.e. wolf, owl, etc.). It will be this student's job to find as much prey as she/he can without moving her/his feet. All other students will become prey (i.e. rabbits, mice, etc.), and their job is to camouflage (hide) and not be seen.
2. The predator starts the game by closing his/her eyes and counting to ten. During this time the prey must all find a place to hide in defined playing area. The prey can only go as far as they can get in ten seconds. Once the predator gets to 10, he/she can open his/her eyes and start to look for prey. While doing this, the predator can't move his/her feet and must only point out students that he/she can see (no guessing). If a student (prey) is found, he/she must come back to the start and stand/sit behind the predator. Prey that has been found can't help in finding the other students.
3. When no other prey animals can be seen, the predator should close his/her eyes and tell (scream to) the students to "come closer." They cannot stay where they are and must move closer to the predator, not farther away. This time the predator will only count to five seconds. Once again, after 5 seconds have the predator open his/her eyes and try to find as many students as possible. Same rules apply as above.
4. Keep playing until the predator has found all the prey or until there is just one student left.

Wrap Up:

1. Ask the students about the game. What is camouflage? Why do animals have camouflage? What do they think the point of the activity was?
2. If you are a predator, why is it important to blend in with your surroundings? How about if you were the prey?
3. What were some strategies both the predator/prey used to succeed in this game?

Adapted from: Cornell, Joseph, 1979. Sharing Nature with Children. Dawn Publications.

Fallen Log

Objective: Students will be able to describe the decomposition process and identify organisms that live on, in, or near the fallen tree.

Method: Students will explore a microhabitat.

Location: Along any trail with many fallen logs

Time: 25-30 minutes

Materials: Fallen Log worksheets, clipboards, and something to write with, id guides, magnifying lenses

Vocabulary: Microhabitat, camouflage, decomposers, fungi

Background information: So much of what lives in the forest exists in places we normally don't pay attention to. The FBI (Fungus, Bacteria, and Invertebrates) help break down organisms in the forest and help give new life to things we (humans, and animals) need to survive. In this activity students will learn what is truly alive in a dead tree.

Procedure:

5. Split the students into groups of 2 or 3.
6. Show the students what the boundaries are for the activity; making sure you can see the students at all times.
7. Tell the students to be careful when moving logs, and ask them to put everything back where they found it when finished.
8. Hand out the worksheets and other materials to each group.
9. Give the students time to answer the questions and explore the area.
10. When they have completed the worksheet, have the groups come back together to discuss their observations.

Wrap Up:

1. What did you find? What similarities and differences were there between the different sites?
2. What kind of organisms did you find and how did they interact with the fallen log?
3. Why is it important that these logs decompose?
4. How does the ecosystem benefit from a fallen log?

Adapted from:

Project Learning Tree, The Fallen Log pgs. 72-74, 2004.

The Fallen Log Worksheet

1. Is there bark on the log? What is its condition?
2. What kinds of plants are growing on the log? (Examples are: young trees, young shrubs, wildflowers, mosses, fungi, slime molds, lichen)
3. What kinds of plants are growing on the bark? Under the bark? Inside the log? Under the log?
4. What do the animals you found appear to be doing? What do you predict each one eats? What makes you think so?
5. What evidence of animal activity do you see on or around your log? (Examples are: insect holes, spider webs, woodpecker holes, animal dens, animal tracks, piles of sawdust, or patterns in the wood under the bark.)
6. How might the tree have died? What evidence supports your idea?
7. Has this tree been dead a long time or a fairly short time? What makes you think so?