

Life on Earth: Our Biotic World

Habitats and Ecosystems (tide pools, pond, coastal scrub, beach)

Oh Deer!

Objective: Students will learn about the different elements that comprise a habitat in a kinesthetic way.

Materials: Enough space for the group to be able to run, preferably with 2 distinct boundary lines.

Procedure:

1. Explain that food, water, and shelter are essential components of a habitat. If an animal does not have these three things, it will die and decompose, and re-enter the cycle of life as part of the habitat. Discuss what kind of food, water, and shelter a deer would use.
2. In this game, everyone will use symbols for each element. Teach the symbols: for *food*, everyone should put their hands over their stomachs; for *water*, they should make an ocean wave movement in front of their mouths; for *shelter*, they should make a tent with both hands over their heads. Review the symbols multiple times until everyone remembers them.
3. Divide the group into 4 smaller groups. Explain that the "ones" are going to be the *deer* and the "twos, threes and fours" will be the *habitat*. The *deer* will line up on one side and the *habitats* will line up on the opposite side (20-50 feet apart).
4. While you count to three, the *deer* will huddle together and each *deer* will pick a symbol (water, shelter, or food) to represent what they are "looking for." Each *deer* can choose their own symbol; they do not need to all have the same symbol. The *habitats* will also huddle together and each *habitat* will choose a symbol (water, shelter, food) of what they are going to "be." Each *habitat* can also choose his/her own symbol.
5. When you are finished counting, both sides will turn around and show their symbol. They may not change their symbol during a round. The *deer* will run over to the *habitats* and try to find a *habitat* with a symbol that matches their own. *Habitats* can NOT move themselves, and thus the *habitats* cannot run. If a *deer* finds one, he/she will bring that player back to the *deer* side for the next round. (Each *deer* may only pick one *habitat*.) If the *deer* does not find a symbol to match its own, that *deer* will stay on the *habitat* side and become a *habitat* for the next round.
6. Explain how this relates to the life of a deer. If it does find everything it needs, it will reproduce (thus bringing the *habitat* over to "become" a new *deer*). If it does not find what it needs, it will die and become part of the habitat (through decomposition).
7. Play 10-15 rounds (they can change symbols at the beginning of each new round).

Plants and Animals (adaptations/life cycles)

Seeing/Drawing Leaves

Objective: Understand leaf structure (shape, edges, veins, etc.) and practice leaf data collection.

Materials: Leaf per student, paper, and pencils

Procedure:

8. Have children draw leaf shapes looking closely at a leaf. Try different perspectives. How does a leaf on the ground look from the top of a skyscraper? From standing up above it? From on your hands and knees? From a bug walking on it? From a cell inside it?
9. Distribute a leaf to each student. (Choose leaves that have a very simple form, smooth edges, simple vein structure and one that lies reasonably flat on the table. California Bay Laurel is a good start.)
Have students hold the leaf in one hand, and feel all around the edge of the leaf with the other hand. Then pick up a pencil and trace the shape of the leaf in the air. Practice several times. Add veins, brown spots, etc. Now draw on paper. Then try a more complicated leaf such as a leaf that has jagged edges or inter-connecting veins. Emphasize that when students are in the field (if time permits), the plant holds the leaf for them. They do not pick it to sketch it.

Hello Flower!

Objective: Become familiar with wild flowers in the Marin Headlands.

Materials: Flower cards and nerf ball

Procedure:

1. Find large pictures of flowers that would be found in the Headlands. The flower cards should be easily visible from across the room. Picture should cover most of the card, with the name at the bottom.
2. Sitting in a circle, each child holds a flower picture with the name showing. The game is played by throwing a nerf ball to one child, singing the name of his plant: "Hello, Lupine!" as the ball is thrown to him. He then throws the nerf ball to another cardholder, singing the name of her card: "Hello, Poppy!" and so on around the circle. Once the game has been played with all flowers showing, the names are folded under, with just the picture of the flower showing, and the game continues in the same manner.
3. This game can be used for any aspect of natural history...mammals, rocks, etc. After the trip, a game might include names of animals, plants, marine invertebrates, etc.

Birds and Worms

Objective: Understand the purpose of camouflage and why it benefits the organism.

Materials: Colored toothpicks and a lawn area.

Procedure:

1. "Worms", 10-15 toothpicks each of four different colors, are spread out over about 200 square feet of lawn.
2. Participants become birds looking for worms to eat. They first guess which "worms" will be easiest to find, then they make the first flight for about 30-45 seconds. Talk about the results and compare them to your guess. Try a second flight.
3. Talk about what you have learned about protective coloration. If you were a worm, what color would help you survive?
4. Try the exercise again with red cellophane over the birds' eyes.

Ecology/Interdependence (e.g. predator/prey)

Balance in Nature

Objective: Intro to population ecology, exploring population dynamics and interactions.

Materials: 200 beans and playing area

Procedure:

1. Tell your students that they have become ground squirrels and should find their own "burrow" or living space at the edge of an open area. Liberally scatter about 200 beans over a portion of the ground. These beans become "acorns" that the squirrels must gather in order to eat and survive through the day. Each squirrel must gather five acorns each day, and the day lasts two minutes.
When you say, "begin," the ground squirrels come out of their burrows and begin foraging for acorns. They must acquire five acorns and be back in their burrows before the end of the day. Be sure they play safe and occasionally let them know how much time they have left. After the two minutes, go to each squirrel and collect the acorns; any squirrels that do not have the required number of acorns have "died" and must leave the game. Any squirrels with extra acorns may save them until the next day. Re-scatter the collected acorns. (Use the first few rounds as practice. You may adjust the duration of the day or the number of acorns according to your group's performance. Keep it challenging, yet attainable).
2. Once the game is moving along smoothly and a few dead squirrels have left the game, you may explain that in nature it takes food and energy to raise a family and that reproduction is an essential part of any organism's life. Therefore, any squirrel that collects five extra acorns in a day, may reproduce and bring a dead squirrel into the game as its young. (You may want to start recording the number of live squirrels at the end of each round. This can be used later to demonstrate that a fluctuating population often expresses a balance in nature.)
3. In a squirrel's habitat, there are other things to worry about besides food. There are predators out there that need to eat too! Take several of the dead squirrels and through decomposition, turn them into red-tailed hawks with nests. The hawks must eat one squirrel each day to survive. After they tag a squirrel, they walk the squirrel back to their nest. If they wish to reproduce, they can tag another squirrel. Hawks who do not tag a squirrel will leave the game. It helps to identify hawks with some colored paper on their clothes, and it helps if the hawks begin hunting a few seconds after the squirrels begin foraging. You may want to keep track of the numbers of squirrels and hawks you have during each round; it will enhance your discussion later.
4. You can also take a few of the dead squirrels from outside of the game and turn them into rattlesnakes. Rattlesnakes are also predators that eat

squirrels (one per day) and may reproduce. Note: rattlesnakes are prey for hawks, and hawks may survive by eating one snake per day.

5. (Optional) Other animals may be added to the game. Let your students' creativity run free. Have them create more animals to develop a balanced ecosystem.

Examples: Deer eat acorns but need ten per day. Mountain Lions need one deer and one squirrel per day to survive.

Evaluation:

1. Name some of the food chains in this game – acorn-squirrel-rattlesnake-hawk.
2. Identify the predators and prey in this activity
3. Discuss how predators are dependent on their prey for food and how the prey are dependent upon the predators to control the population and weed out sick and diseased individuals. Predators and prey are interdependent.
4. Introduce decomposition. How could a dead squirrel or hawk be decomposed and eventually end up as another organism? What would an ecosystem be like if there were no decomposers?
5. Were the squirrels sharing or competing for the acorns? What other animals do squirrels compete with for acorns?

Food Webs

Food Chain Pyramid

Objective: Students learn about the food web, different trophic levels of organisms. Understand the consequence of a species going extinct.

Materials: Block (paper) per student

Procedure:

1. Students learn about the food chain and use blocks to build a food chain pyramid. Students discuss the extinction of species and the effect this has on other living things in the pyramid.
2. Each student has a block (can be made from paper cutout). Choose one particular habitat such as forest, river, or ocean. Each student chooses one plant or animal that lives there. Magazines and other publications can provide ideas and stimulate interest in a variety of species. Make sure that students choose plants and animals including producers, consumers, herbivores, carnivores, omnivores, predators, and prey. Be sure to include our own species as well – Homo sapiens. Each student researches their organism and determines which category or categories that his or her organism belongs to.
3. Each student writes the name of his or her organism and/or sketches it on the piece of paper and tapes it to one of the blocks.
4. Build a "food pyramid" with the blocks, beginning at the bottom with the plants or producers and working up through the consumers – herbivores, omnivores, carnivores/predators, and scavengers. (You may choose to include or leave out the decomposers for simplicity.) Organisms are placed above the organism they eat. It should look something like this:

/ — Scavengers — \

/ — Carnivores — \

/ — Herbivores — \

/ — Plants/Producers — \

5. Ask one student to remove a block, stating that this animal has become extinct and no longer is part of the food chain. At times, no blocks will fall; other times, a few blocks may fall. Continue to remove blocks observing what happens each time one species is removed. Using this visual activity, you can generate a class discussion on what the implications are for this in the natural world. Why do other blocks fall when one is removed? Can any one species exist alone in the world?

Photosynthesis

Seeing/Drawing Leaves

Objective: Understand leaf structure (shape, edges, veins, etc.) and practice leaf data collection.

Materials: Leaf per student, paper, and pencils

Procedure:

10. Have children draw leaf shapes looking closely at a leaf. Try different perspectives. How does a leaf on the ground look from the top of a skyscraper? From standing up above it? From on your hands and knees? From a bug walking on it? From a cell inside it?
11. Distribute a leaf to each student. (Choose leaves that have a very simple form, smooth edges, simple vein structure and one that lies reasonably flat on the table. California Bay Laurel is a good start.)
Have students hold the leaf in one hand, and feel all around the edge of the leaf with the other hand. Then pick up a pencil and trace the shape of the leaf in the air. Practice several times. Add veins, brown spots, etc. Now draw on paper. Then try a more complicated leaf such as a leaf that has jagged edges or inter-connecting veins. Emphasize that when students are in the field (if time permits), the plant holds the leaf for them. They do not pick it to sketch it.

Human Connections and Impact (beach clean-ups, invasive plant removal)

We All Need Trees

Objective: Understanding of where most everyday products come from. Think about amount of trees used everyday.

Materials: Backpack with tree products (fruit, pencil, journal, sunscreen, gum)

Procedure:

1. Children are often surprised to learn how many different products we get from trees. Use this activity to help children learn just how much we depend on trees in our daily lives.
2. Take a walk with children, and bring along a daypack filled with a few tree products, for example, fruit (e.g., apple, orange, mango), a pencil and a journal or a book, sun block, and chewing gum. Pick up a downed tree branch and ask where it came from (a tree). Eat the fruit, and ask children where it came from (a store? a tree?). Ask children to think of other items that come from trees. Discuss some unusual tree products, using the samples from your daypack. Ask critical questions, including:
 - Have you used anything that comes from trees today?
 - How are tree products alike and how are they different?
 - What do you like most about trees?
3. In addition to giving us wood, paper, food, and other products, trees are invaluable assets to our communities. Take a neighborhood walk, and look for newly planted trees and shrubs. How are they protected? Find a place without trees, and compare it with a place with many. Which place do you like best? Why?

Naturally Good Manners

Objective: Students will be able to list guidelines for appropriate behavior on trails, participate safely and actively in learning activities at Outdoor Education, discuss natural resources that may be found at Outdoor Education and develop a personal trail user code of ethics.

Materials: Create a transparency of "People Versus Nature", paper, and pencils.

Procedure:

1. Begin by asking students about natural resources. What are they? Where do they come from? Do we need them? Why or why not?
2. Discuss natural resources that may be found at Outdoor Education.
3. Display transparency, "People Versus Nature."
4. Ask the students to study the drawing and try to list eight inappropriate outdoor behaviors shown there. Make a list of these on the chalkboard. Discuss the impact of each of these on the environment and other people.
5. Let the students know that at Outdoor Education they will be walking on many trails to learn about ecosystems and the plants and animals in them.

Discuss the reasons why appropriate trail behaviors are essential at Outdoor Education.

6. Have students think about which appropriate school behaviors would apply to Outdoor Education, e.g., following directions, respecting others.
7. Now have the students generate a list of appropriate alternatives to the behaviors seen in the transparency. Brainstorm additional appropriate Outdoor Education behaviors. Make a list on the board.
8. Divide class into small groups. Ask them to develop their own "Trail User Code of Ethics." This can be completed as a list of rules, a statement, a pledge, etc.
9. Have each group share their code of ethics with the class.

PEOPLE VERSUS NATURE

