

1. CONTRIBUTOR'S NAME:

Corissa Crowder

2. NAME OF INQUIRY:

Ecosystems are Everywhere!

3. GOALS AND OBJECTIVES:

a.) Inquiry Questions: What is an ecosystem? What things make up an ecosystem? What sorts of organisms does an ecosystem need? What does an organism need to survive?

b.) Ecological Theme(s): Parts of an ecosystem, interactions between organisms.

c.) General Goal: To familiarize students with the parts of an ecosystem and what each part depends on from the other elements.

d.) Specific Objectives: To introduce students to the complexity of ecosystems and the food web, and to use a game to provide an example of what an organism needs in its habitat.

e.) Grade Level: 1-5

f.) Duration/Time Required: 1 hour to 1 ½ hours

→ Prep time – ½ hour

→ Implementing Exercise During Class – 1 hour

→ Assessment – 15 minutes

4. ECOLOGICAL AND SCIENCE CONTEXT:

a.) Background (for Teachers): General knowledge of ecosystems (habitats), the different kinds, and the very basic things that an organism needs to survive.

b.) Background (to present to Students): Ecosystems are all around us, and are composed of many different living things like animals and plants, and non-living things like rocks, soil, water, and sunlight.

5. MOTIVATION AND INCENTIVE FOR LEARNING: Students will gain some basic ecology background in this inquiry, which will provide the basis for many future inquiries. It will also help them think about the outdoors differently, and about the different needs of plants and animals. This inquiry will help to emphasize the interconnectedness of all animals and plants.

6. VOCABULARY:

Organism – Any living thing. Plants, animals, mushrooms, and people are all organisms. Rocks, minerals, and water are not.

Ecosystem – A group of living organisms (such as plants, animals and soil microbes) and the non-living parts of their environment (such as rocks, soil, water, and weather). All of the parts of an ecosystem are connected to each other.

Producer – An organism that can make its own food using the energy from the sun.

Herbivore – An animal that eats only plants or other kinds of producers.

Carnivore – An animal that eats only other animals.

Omnivore – An animal that eats both plants and other animals.

Decomposer – A living thing that gets its energy from breaking down the remains of dead organisms.

Food Web – The overlapping food chains that link producers, consumers, and decomposers in an ecosystem.

7. SAFETY INFORMATION:

Ensure that the students use the string as directed, and that there are no injuries during the game play.

8. MATERIALS LIST (including any handouts or transparency masters):

- Print-out of a basic food chain and a food web (plants, animals, soil and rocks, water, sun, people)
- String, cut into pieces of different lengths
- Cards with ecosystem component names (abiotic and biotic) and photos

9. METHODS/PROCEDURE FOR STUDENTS:

a. Pre-investigation work:

An ecosystem is a group of plants and animals interacting with one another and with their physical environment. Ecosystems are all around us, and are composed of many different living things like animals and plants, and non-living things like rocks, soil, water, and sunlight. Ecosystems are made up of many different kinds of organisms, which can be any kind of living thing. Plants, rabbits, deer, grass, and people are all organisms. All of parts of an ecosystem are interconnected, and depend upon each other for survival. This is sometimes called the circle of life. Many times, if one thing changes, it can have many cascading effects on the other members of the system.

The basic needs of any organism are food, water, and shelter or space. An organism gets these needs fulfilled by interacting on other organisms (biotic factors) or non-living things (abiotic factors) in its environment. An ecosystem can be either small, containing only a few interacting species, or it can be very large, when many plants and animals depend on each other to get their needs met. There are also many different kinds of ecosystem habitats, and different animals live in certain places depending on their specific needs.

Different living things have very different ways of getting their energy. A plant's energy is provided by the sun, a squirrel's is provided by the nuts and seeds that it eats, and a coyote's is provided by the other animals that it eats. Because plants can make their own food using the sun, they provide the basic energy that drives all of the parts of an ecosystem. They are called the ecosystem producers. Animals that must eat other organisms to survive are called consumers. Animals that eat plants are called herbivores, and animals that eat other animals are called carnivores. Some animals are omnivores, which means they eat both plants and animals. Others get their energy from breaking down the bodies of other dead organisms. No matter what an animal eats, it always has to obtain its food from some other part of its environment.

b. Investigation work:

- 1) The students will first be taken outside, and will be given the basic rules of the "Oh, Deer!" game. They will play the game for 15 rounds, during which they will experience the dependence of organisms on their physical environment.
- 2) After the game is completed, the students will be asked if real ecosystem interactions are so simple; that is, if an organism is independent from the others in its community. Though a single animal may have only three basic needs, other animals will depend on them to fulfill their needs as well. They

will be told that the game was an example of a simple food chain, and that a more realistic way to show the many interactions between animals and their environments is the food web.

- 3) Each student will then have a card with an ecosystem part or an organism name taped to their backs. By using the pieces of string, they will try to arrange themselves in a way that indicates relationships in the ecosystem, such as predation and herbivory. Using this method, they will attempt to form a food web for the system. This will help to indicate how complex ecosystem relationships can become.
- 4) After this activity is completed, the students will be asked to share what they learned with the rest of the class, and can comment on food webs and the many needs of plants and animals. We will discuss the dependence of animals on all of the parts of their environments, and also add that as human beings we are a part of our environment as well, and what we do can affect many parts of our ecosystems.

- 1) What evidence (data, samples) do students collect? Students observe the complexity of the food web, and get a hands-on experience with ecosystem interactions.
- 2) How do students present the evidence (data)? Students will present their observations to the rest of the class, as well as record them in their nature journals.
- 3) What conclusions are drawn from the evidence students collect? The students can conclude that every part of an ecosystem is connected, and that changing any part of it will affect the rest in some way.
- 4) Include examples of data sheets.

10. **ASSESSMENT:** Pre- and post- activity reflections in the students' nature journals.

11. **EXTENSION IDEAS:** To further emphasize the idea that ecosystems are very complex, the students could potentially visit a local park or outdoor garden, and tally the different number of plants and animals that they see. The students could also create their own food webs on pieces of paper, using old magazines such as National Geographic to find pictures of plants and animals.

12. **SCALABILITY:** For older students, more emphasis could be placed on vocabulary such as consumers, producers, abiotic factors, biotic factors, carnivores, and herbivores. The older students could also be expected to arrange the food web by themselves, with several of the students not having ecosystem tags, but instead acting to help arrange the other students in order.

13. **REFERENCES:** Unit D: Populations and Ecosystems. Discovery Works, Houghton Mifflin Science Textbook.

14. **LIST OF EXPERTS AND CONSULTANTS:** Allison Greene and Eliza Donoghue

15. **EVALUATION/REFLECTION BY FELLOWS AND TEACHERS OF HOW IT WENT:**

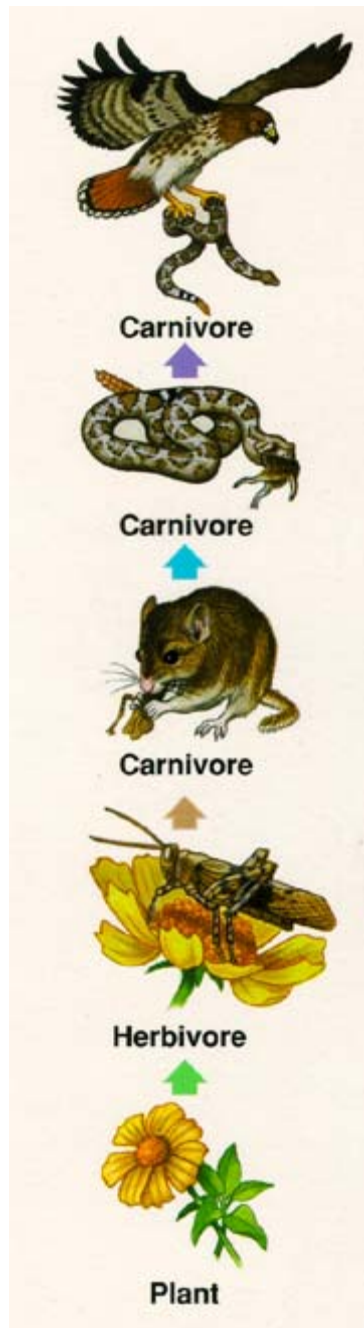
Instructions for the “Oh, Deer!” Game:

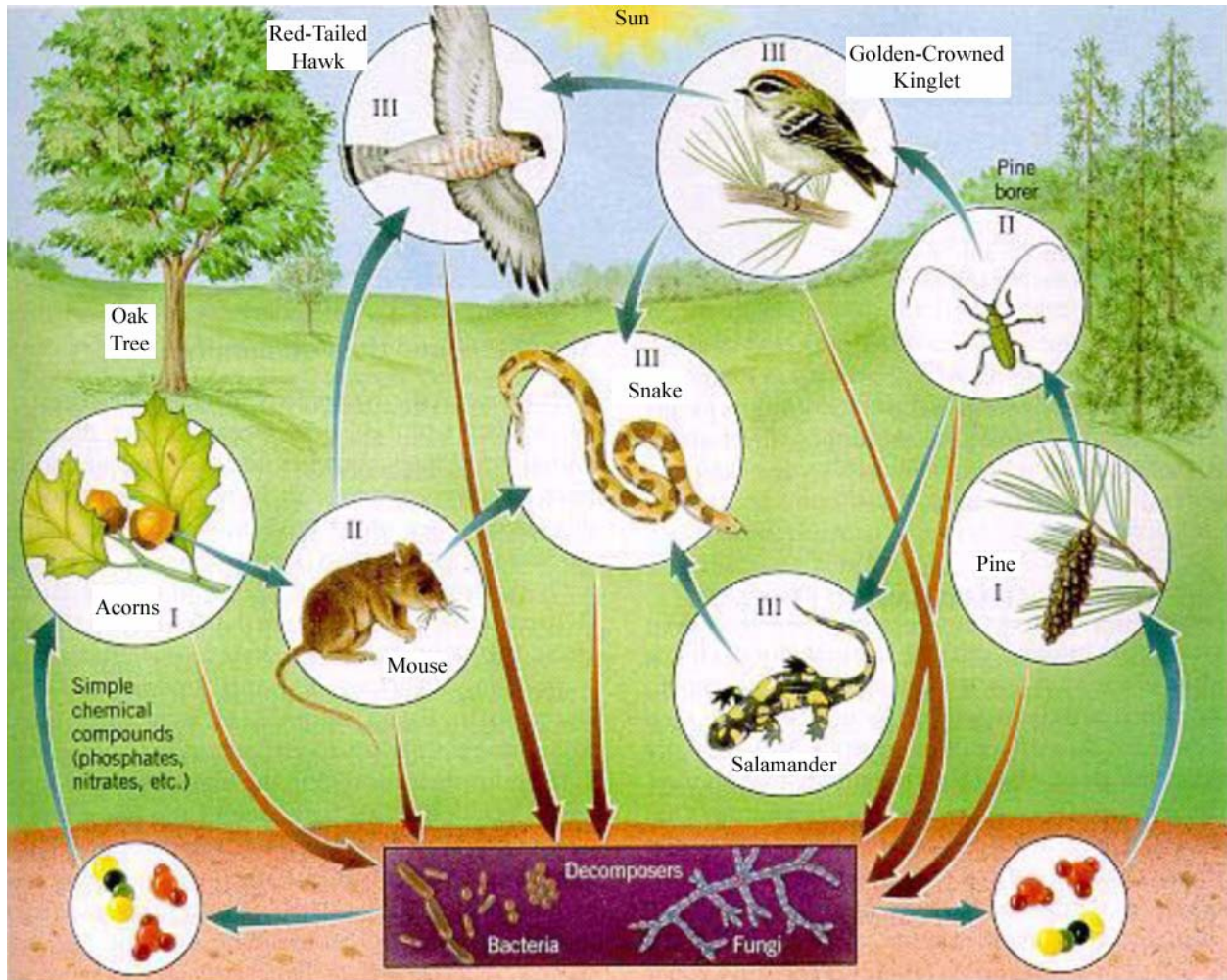
1. Describe the fundamental necessities of animals: food, water, and shelter and space in a suitable arrangement.
2. Demonstrate to students that without these essential components, animals cannot survive. Do this by playing *Oh Deer!*
3. Have students count off in fours, with all those sharing the same number gathering in certain corners of the classroom. (This game is best played outdoors but may be adapted to inside play.)
4. Mark off two parallel lines on the playground or floor that are about ten to twenty yards apart.
5. Have all the "ones" behind one line and all the rest behind the other line. The "ones" will become the deer.
6. The other students will become the components of habitat: food, water, and shelter and space in a suitable arrangement.
7. When a deer is looking for food, it should clamp its hands over its stomach. When it's looking for water, it puts its hands over its mouth. When it is looking for shelter or space, it holds its hands together over its head. A deer can choose to look for any of these needs during each round, but it cannot change what it is looking for in that round. It can change in the next round if it survives.
8. The students who are the components of habitat may choose which they will be at the beginning of each round. They will depict that component in the same manner as the deer.
9. The game starts with all players lined up on their respective lines and with their backs to the students at the other side. The teacher asks all students to pick their sign. When they are ready, count: "One...two...three." At the count of three, the students turn and face each other showing their signs.
10. The deer run to the habitat component they are looking for and take that component back to the deer side of the line. (This represents the deer's successfully meeting its needs and reproducing as a result.) Any deer that fails to find the component it was seeking dies and becomes part of the habitat, joining the students on the habitat side.
11. The teacher keeps track of the number of deer at the beginning and ending of each round. Continue play for fifteen rounds.
12. At the end of fifteen rounds discuss the activity; encouraging the students to talk about what they experienced and saw. The herd grows in the beginning, and then some must die as the habitat is depleted. This fluctuation is a natural process unless factors which limit population become excessive.
13. The teacher should make a line graph of the number of deer alive at the end of each round to show that it is naturally cyclical.
14. Have the students summarize what they have learned from the activity.

Example ecosystem list for a Montana forest habitat:

Grizzly Bear
Mountain Lion
Coyote
Red-Tailed Hawk
Crow
White-Tailed Deer
Snowshoe Hare
Elk
Western Painted Turtle
Beetle
Fly
Grass
Grasshopper
Sparrow
Tree Frog
Soil
Deer Mouse
Mushroom
Bacteria
Trees
Acorn
Berries
Squirrel
Sun

Sample Food Chain and Food Web:





Grizzly Bear



Mountain Lion



Coyote



Red-Tailed Hawk



Crow



White-Tailed Deer



Snowshoe Hare



Elk



Painted Turtle



Lady Bug



Fly



Grass



Grasshopper



Sparrow



Tree Frog



Soil



Deer Mouse



Mushroom



Bacteria



Oak Tree



Acorn



Berries



Squirrel



Sun

