



Web of Life

Subject Area: Environmental Science

Core Curriculum Content Standards: 2.5AC&D, 3.3A, 3.4A, 4.1A, 4.4A
5.5A&B, 5.10A&B, 6.6E

Session Description

During this exciting simulation game, students learn about predator-prey relationships, the food pyramid, biocumulation, and the Four Laws of Ecology: 1) everything is connected to everything else, 2) everything goes somewhere, 3) nature knows best, and 4) there is no such thing as a free lunch.

Objectives

1. While roleplaying herbivores, omnivores, and carnivores in a simulation game, students will strategize to meet their basic needs.
2. By analyzing the number of animals left alive at each level of the food pyramid when the game ends, students will infer the normal ratios of producer and consumer populations in real habitats.
3. By analyzing the amount of pesticide left at each level of the food pyramid at the end of the game, students will infer the causes of biomagnification.
4. Students will explain the four laws of ecology by supporting them with evidence from the game.

Materials

shower rings – one per player
6 green life tags per herbivore
2 pink pesticide tags per herbivore
6 blue life tags per omnivore
4 red life tags per carnivore
4 flag life tags per man

food, water, etc. stations w/ markers
green armbands for herb. (optional)
blue armbands for omnivores
red armbands for carnivores
flag armbands for man
yellow armbands for the elements

Procedure

1. Begin the game by making sure the students understand the following terms: herbivore, omnivore, carnivore, food chain, and food web. For older students, you may also want to define producer, consumer, secondary consumer, and tertiary consumer.

2. Inform students of the rules. Refer to the posters as you tell the rules. If students have already been assigned a role (do this with larger groups as they enter the meeting place by randomly passing out armbands) encourage them to listen closely while you go over their specific goals. If students have not yet been assigned roles (do this with smaller groups by asking for volunteers beginning with the elements and moving down to the herbivores) tell them not to worry about memorizing all of the rules until they find out their role. It is helpful to have the students seated in groups according to their roles with a poster defining their goals close by.

Rules:

Herbivores will be let out first. They will wear green armbands (or nothing) and carry a shower ring with 8 green life tags, two of which have been tainted with pesticide. They must find each of the food, water, shelter, and space stations, mark their hand or wrist with the washable marker found at each station, and try not to get tagged for the rest of the game.

Omnivores will be let out 10 minutes after the herbivores. They will wear blue armbands and carry a shower ring with 6 blue life tags. They must find the water, shelter, and space stations and mark their hands accordingly. They must also find food, either by finding the food station and tagging at least one herbivore, or by tagging at least two herbivores. When an omnivore tags an herbivore, the herbivore must stop and hand over a life tag.

Carnivores will be let out 10 minutes after the omnivores. They will wear red arm bands and carry a shower ring with 4 red life tags. They must find the water, shelter, and space stations and mark their hands, but to eat, they must tag at least four omnivores or herbivores. When an omnivore or herbivore is tagged, it must hand over a life tag to the carnivore.

Man will be let out 10 minutes after the carnivores. Man does not have to find any stations. He may kill herbivore, omnivores, and carnivores by pointing to them when within twenty feet and saying "Hasta la vista." An adult will go with Man to facilitate these killings. When an animal is "killed" it must hand over a life tag to man.

The Elements will be let out 10 minutes after man. They may collect as many life tags as they can by tagging anyone else in the game except other elements.

The game ends after the elements have played for 10-15 minutes, a 50-60 minute game in all.

3. Before students ask questions, add the following rules:

1. When you are tagged, you must hand over either a pesticide tag or your **own color** life tag.
2. When tagged by an element you must hand over your own color life tag.
3. You may not tag the same person twice in a row.
4. You may not tag anyone who is giving or receiving a life tag.
5. You may not tag anyone who has the same role as you.
6. If you lose all your life tags before the final whistle is blown, return to the starting point.
7. If you set foot on the road, the teacher there will take a life tag symbolizing that you have been hit by a car.
8. You may not go inside any buildings, or climb trees.
9. When the final whistle is blown, return to the starting point with your life tags.

4. Clearly describe the boundaries of the game to the students and teachers. **At this point, all but one or two teachers (depending on how many students you have playing "man") should**

be taken by the SOC staff to a point on the boundary to ensure that students do not get lost, and assist with injuries, disagreements, etc. It is essential that at least one adult be placed on the road in front of the statue. It is also helpful to place adults near (but not next to) the station markers so that they can bring them in at the end of the game and ensure that the markers remain there and stay capped. For a group size of 70, acceptable boundaries would include Long House Lawn, the wooded area behind Long House, in front of and behind Lenape to the Astronomy dome, the campfire circle, Piney Point, and along the lake edge in front of Lenape, across the beach and to the road.

5. Allow children a few minutes to ask questions and to study the posters describing their role. Then line up the herbivores and hand them their shower rings and life tags as they leave Long House. Continue to send out the players at the ten minute intervals described above.

Summary

1. When the students return, have them sit in groups according to their roles. In order to give students a chance to be appreciated for their skill in the game, ask all herbivores with 1 or more remaining lives to raise their hands, 2 or more, etc. Do this for each level of the pyramid. Allow the elements and man to show how many life tags they obtained.
2. If there is time, have each level of the pyramid record the total number of their own life tags which they have retained. List these numbers on the board in a pyramid arrangement next to the original numbers. Which group still remains the largest? Which the smallest? What would happen if we started with more carnivores than herbivores and omnivores? Would the game be any fun? What would happen if those numbers existed in a real forest? What can you predict about the populations of each level of animals in a real habitat?
3. Now have students raise their hands to indicate how many pesticide tags they have. In which group did the animals end up with the most pesticide? How is this possible? Inform students that the name for this occurrence is biomagnification and that it did occur in the United States in the 1940's after the use of DDT, affecting the populations of many of our predatory birds.
4. Finally, show students the poster of the four laws of ecology, and have them explain each law and support it with an example from the game.

Classroom Extensions

If desired, data collected during the summation can be provided to the visiting teachers. Students can then graph the changes in population and pesticide magnification at each level of the food pyramid to reinforce inferences made during the summation.

NOTE: Adhere to the following ratios for determining number of carnivore, omnivores, etc.: for a group size of 47, 24 should be herbivores, 12 should be omnivores, 6 should be carnivores, 4 should be elements, and 1 should be man.