



Survive!

LESSON

GRADE LEVEL 4-7

CATEGORY Plants, Animals & Habitats

TOPIC Ecosystem food chain and food web interactions

TIME

Varies 20 minutes each phase or one science period per phase

MATERIALS

- 3 colours of pinnies, scarves or vests for role identification
- 3 buckets for food tokens
- 3 different color tokens for food, plus 4th colour token for life Tokens; Forest Stories

SETTING

Indoors or outdoors

GROUP SIZE

Whole class

SUBJECTS

Science, Physical Education

SKILLS

Assessing, communicating, dramatization, evaluating, interpreting, movement, role-playing, synthesis

KEYWORDS

Predator, prey, food chain, food web, starvation, disease

Overview

Students play a lively game that simulates predator/prey relationships and the role of natural factors (disease and starvation) in ecosystems.

Objectives

Students will:

- understand the interrelationships of animals in the forest; and
- identify food chains and food webs of a forest.

Background

Just as each individual part of a tree is vital to the life and growth of a single tree, so too is each part of the forest community responsible for the forests health and well-being. The forest is composed of biotic (living) and abiotic (non-living) components. The biotic parts of the forest include wildlife, trees, shrubs, wildflowers, mosses, lichens, fungi and microscopic organisms. The abiotic parts of the forest include water, nutrients, rocks, sunlight and air. The biotic and abiotic elements of an ecosystem are connected through flows of energy and the cycling of chemical elements, and is referred to as an ecosystem. A forest is one ecosystem and can be looked at in terms of its structure, the processes that go on within it, or the way they change over time.

One way of looking at the interactions in forest communities is by examining food chains and food webs. A food web is a model of several food chains interacting in an ecosystem while a food chain is the direct dependence on one another for growth and survival (coyote eats rabbit, rabbit eats plant). In most situations, the flow of food material is more complicated than in a simple food chain in that many animals eat a number of different foods, depending on availability.

One type of food web begins with green plants and extends to herbivores, carnivores and omnivores. The sun transfers energy in the form of light to green plants. When combined with water, minerals and organics from the earth and carbon dioxide from the air in the presence of chlorophyll in the leaves, this energy makes food that the plant uses and stores. This energy is transferred to any number of plant-eating animals when they eat the plant or parts of the plant. And then an animal, in turn, is eaten by another animal who may be an omnivore having also eaten the plant. The complexities of food chain interactions in a food web can vary greatly. The following game attempts to demonstrate the interactions of energy in a simple food web.

Procedure

Warm Up

1. This activity is a tag-type game played in three phases: Phase 1— Predators and Prey (coyote and rabbit) Phase 2 — Plants (introduce plants) Phase 3 — Starvation and Disease (introduces these two natural factors) The timing of each phase can be adjusted to fit your class' understanding of the concept.
2. You can use any combination of animals but it works best if students have studied something about the predator/ prey combination prior to playing this game.
3. This game is best played out in a field or in the gym.

The Game

PHASE 1 - Predators and Prey (coyote and rabbit)

4. Split the students up so that one quarter of the students will wear one colour pinnies (coyote), and the rest will wear any another colour pinnie (rabbit).
5. The object of the game is for those wearing the coyote pinnies to tag all of the rabbits wearing other colour pinnies as quickly as possible. Students who are caught must give up their pinnies to their captors, and the coyotes escort the rabbits to a resting place.
6. The game continues until all the rabbits are caught. The number of pinnies that each coyote has collected will be counted.
7. Repeat the game with different students wearing the pinnies of the coyotes if desired.

PHASE 2 - Plants: (introduction of plants as food for the rabbits)

1. In this phase, the rabbits will have food to eat. Use different colored tokens which could be (poker chips, bottle caps etc. – that can be easily carried). These tokens will represent three different foods for rabbits. Spread the buckets around the playing area (up to 6 buckets). Make sure to use separate buckets for each of the 3 food "types". You should have the same number of each coloured tokens as you have rabbits, so all rabbits have equal opportunity to collect one token of each colour of not captured by a coyote.
2. Have enough Life Tokens for each rabbit and extra pinnies for rabbits and coyotes that are brought to life in this phase of the game. The leader should remain in the rabbit resting place where coyotes and rabbits are 'safe'

(no capture in this zone). Use a helper or 'dead' rabbits (no pinnies) to return tokens to buckets as appropriate.

3. Play the game as in Phase 1, except that each rabbit has the job of collecting three different food items (tokens) from the different buckets.
4. Once they have three different coloured tokens, they can bring them to the game leader so they can bring one of the 'dead' rabbits to life (give rabbit a pinnie and enter the game again). The food tokens are put back in the appropriate buckets by a helper (or another 'dead; rabbit). If there are no rabbits to bring to life, the successful rabbit will receive a differently coloured 'life token'. The rabbit can then use the 'life token' if they are captured by a coyote (and thereby keep their pinnie), or if not captured, they can trade in the 'life token' to the helper and bring a rabbit back to life when one becomes available.
5. When a coyote catches three rabbits they can bring in the 3 pinnies or any number of collected 'life token' to the helper. They then take one of the dead rabbits back into the game as a coyote (wearing a coyote coloured pinnie, of course).
6. If the rabbit population is growing too fast, increase the number of tokens they need to collect. If the coyotes are catching too many rabbits, decrease the number of tokens the rabbits have to collect.

PHASE 3 - Stalked By Starvation and Disease

1. In this phase of the game, disease and starvation will be introduced. Both rabbits and coyotes can die in this round but can also be brought back to life as in Phase 2.
2. Select two students, one to represent disease and one to represent starvation. The students should wear a pinnie or some other identification to easily separate them from the coyotes and rabbits.
3. The disease and starvation students will try to catch either rabbits or coyotes during this phase. Rabbits and coyotes are "killed" if they have one or fewer pinnies or food tokens. If a rabbit or coyote is caught and has more than one pinnie or food token then they must then give up a food token (rabbit only) or pinnie (coyote or rabbit). During this exchange, rabbits can be caught by a coyote (there is no time out rule – i.e. as scavengers coyotes eat dead animals).
4. Starvation and disease players should select weak and tired coyotes and rabbits as a natural strategy during the game. If necessary have a quick brainstorm with these two player prior to sending them into the game.



5. Rabbits or coyotes that are killed must wait to be brought back to life by a rabbit or a coyote (as in Phase 2) with either three food cards (rabbits), a LIFE Token (coyotes & rabbits) or pinnies (coyotes or rabbits).
6. After this phase, discuss with the students how disease and starvation have changed the dynamics. What other factors might have an impact? Also ask why there was no time out rule for the coyotes in this phase?

Evaluation

1. Illustrate a food web in the forest. Define the food chains in the web using circles and oblong shapes and different coloured pencils.
2. Have students re-design the game using a different ecosystem or with other limiting factors. Have students discuss or work out different outcomes based on their changes to the game, thereby demonstrating learning outcome understanding. Play the 'new' game with another class to test it and rewrite if needed.
3. Discuss the roles that were played in the game by each group of students.
4. Brainstorm with class to identify the key words in this activity and have students write definitions and give an example of each key word.
5. What characteristics did the most successful coyotes (predators) have? What characteristics did the most successful rabbits (prey) have?

Extensions

Using the Forest Stories have the students diagram the food webs and list any other predator prey relationships found in the stories.

References

This activity was adapted, with permission, from Ratz, Sherry. **The Forest Community: A Simulation Exercise.** The Waterloo County Board of Education.

