

7. Ecosystems in Action: Web of Life

Source: Adapted from “Energy Web (Web of Life)” by Gareth Thompson in *Green Teacher*, Issue #44, and Diane Lawrence, Faculty of Education, Queen’s University

Description

Within an ecosystem everything is interconnected and organisms are continuously affected by elements in their environment. Loss or disturbance of any plant, animal, or natural element will have a negative impact on the other components of the ecosystem. The activities below will describe these basic concepts to the students. It is hoped that students will understand that human activities can cause habitat destruction and pollution and have serious consequences for the ecosystem as a whole.

Background Information

Your ‘habitat’ is where your home is! Greek words meaning “the study of the home” have given us the term ‘ecology’ to describe the relationship between living things and their non-living environment or habitat. A wetland, for example, is very different from a desert or mountain ecosystem. In each case, the plants and animals – from the tiniest algae to the largest mammal – are adapted to the conditions found there. These conditions are created by such non-living factors as the nature and availability of water, air, light, wind, temperature, soil and bedrock, but are modified by the interrelationships with the plants and animals themselves.

Materials

- ▶ large ball of twine or yarn
- ▶ ecosystem tags for students to wear on their back, and then on their front (reused paper with a string works well). The examples below are from a wetland ecosystem:

water	heron	raccoon	loon
rock	air	catfish	worm
dragonfly	fish	black fly	willow tree
muskrat	turtle	beaver	water spider
pond snail	cattail	fungi	leech
soil	trout	cray fish	tamarack tree
mallard duck	bull rush	water lily	sun
Canada goose	algae	mosquito	
frog	snake	water beetle	

Time Allotment

Introduction and 20 Questions Game: 15 minutes

Web of Life: 20 minutes

Human Ecosystem Sculptures (if time allows): 10 minutes

Discussion: 5 minutes

This can be a great outdoor activity.

Teaching/Learning Strategies

To prepare for the first activity, introduce the concept of an ecosystem to the group.

Brainstorm the specific living (biotic) and non-living (abiotic) components of a wetland ecosystem.

1. 20 Questions

- a) Hand out ecosystem name tags that can be hung, pinned or taped to the back of each student. Each tag should name a biotic (mammal, bird, fish, insect or other invertebrate, plant, tree, moss, lichen, algae) or abiotic (physical feature of an ecosystem — water, air, sun, soil) component that can be found in a wetland ecosystem. Depending on the age/experience of the students use general names (turtle) or specific names (snapping turtle). Tell students that they are part of a wetland ecosystem.
- b) The students' task is to discover their new identity. They do this by mingling through the room asking only "yes" or "no" questions and guessing.
- c) Allow approximately 10 minutes for students to determine their identity (you may need to assist some students in discovering their identity by helping with framing questions).

2. Web of Life

- a) Once students have discovered their identity ask them to sit in a circle. Based on their identity ask the students to think about:
 - ▶ what their ecosystem component eats?
 - ▶ what they need to survive?
 - ▶ who eats their character?

- ▶ what provides them with nutrients?
 - ▶ what keeps them from becoming dehydrated?
 - ▶ what is the source of their energy?
- b) Choose one student to begin. Hand her/him the ball of twine. Ask the student to roll the ball of twine to an ecosystem component that he/she gives energy to (that is, who eats it) or who gives energy to it (who it eats — unless it is a green plant, in which case it would be the sun). The second student receives the twine, holds onto a piece, and sends the ball to another ecosystem component in the circle that he/she is connected to. As more connections are made, a web will begin to form (use guiding questions above to make these connections).
 - c) An ecosystem is a set of interactions among living (biotic) and non-living (abiotic) components in a particular place.
 - d) Once all students are connected by the web, ask "What has been formed? What things could affect this ecosystem?"
 - e) From students' suggestions, begin to show how changes to one part of the ecosystem affect the other parts. For example, pretend that humans have come into the forest and hunted almost all of one species of animal. To reflect this, first have the students take up all the slack in the string; then have the hunted animal drop its string, and ask the other participants if they felt a change in the tension. Have affected ecosystem components in turn drop their string, and observe how the change in one element rapidly spreads throughout the ecosystem.

- f) Ask students to suggest other factors that could influence the web of life - e.g., pollution, habitat destruction, pesticide use, drought, etc. The web of life will fall apart, leaving only the sun remaining. Discuss why the sun is not affected.
- ecosystem components to each other visually (e.g., a tree would stand with its arms outstretched; a leaf-eating insect might be crouched pretending to eat one of the tree's leaves, while an insect-eating bird would be preparing to seize the insect in its beak).
3. ***Human Ecosystem Sculptures***
- a) This activity is designed to immediately follow the Web of Life activity if time allows.
- b) Divide students into groups of 5 or 6 that represent a mixture of living and non-living components.
- c) The students' task is to create a group sculpture, using only their bodies, to represent the relationships of these
- d) They should form 2 sculptures - one of a healthy ecosystem, and the second where there has been a negative impact. They will only have 5 - 10 minutes to develop their sculptures.
- e) If time permits have the groups present their sculptures to the class; students in the audience should try to interpret the sculptures and identify what the source(s) of the negative impacts is (are) in the second sculpture.

Follow-up Discussion Questions

- ▶ How are humans connected to the ecosystem that each group created?
- ▶ How are students' individual actions connected to ecosystems?
- ▶ How can ecosystems be protected?

Extensions for additional classroom projects/activities

- ▶ Research other ecosystems in small groups and develop ecosystem tags for the new ecosystems.
- ▶ Study local ecosystems – What animals live there? What plants live there? What are the non-living components? How are they all connected? What, if any, are the threats to their ecosystems? What can each of us do to help keep ecosystems healthy places for the animals to live?
- ▶ Create an ecosystem in your classroom by building a terrarium or aquarium.

Curriculum Connections: Clustering of Expectations

GRADE 4: SCIENCE & TECHNOLOGY—Habitats and Communities (2007)

OE 1 analyse the effects of human activities on habitats and communities

1.1 analyze the positive and negative impacts of human interactions with natural habitats and communities (*e.g., human dependence on natural materials*), taking different perspectives into account (*e.g., the perspectives of a housing developer, a family in need of housing, an ecologist*), and evaluate the ways of minimizing the negative impacts

OE 2 investigate the interdependence of plants and animals within specific habitats and communities

2.2 build food chains consisting of different plants and animals, including humans

2.5 use appropriate science and technology vocabulary, including habitat, population, community, adaptation, and food chain, in oral and written communication

OE 3 demonstrate an understanding of habitats and communities and the relationships among the plants and animals that live in them

3.1 demonstrate an understanding of habitats and communities and the relationships among the plants and animals that live in them

3.2 demonstrate an understanding of food chains as systems in which energy from the sun is transferred to producers (plants) and then to consumers (animals)

3.3 identify factors (*e.g., availability of water or food, amount of light, type of weather*) that affect the ability of plants and animals to survive in a specific habitat

3.10 describe ways in which humans are dependent on natural habitats and communities (*e.g., for water, medicine, flood control in wetlands, leisure activities*)

GRADE 7: SCIENCE & TECHNOLOGY—Interactions in the Environment (2007)

OE 1 assess the impacts of human activities and technologies on the environment and evaluate ways of controlling these impacts

1.1 assess the impact of selected technologies on the environment

OE 3 demonstrate an understanding of interactions between and among biotic and abiotic elements in the environment

3.1 demonstrate an understanding of an ecosystem (*e.g., a log, a pond, a forest*) as a system of interactions between living organisms and their environment

3.2 identify biotic and abiotic elements in an ecosystem and describe the interactions between them (*e.g., ... between the soil, plants and animals in a forest*)

3.8 describe ways in which human activities and technologies alter balances and interactions in the environment