



Science Unit: *Forest Ecosystem*

Lesson 1: *Trophic Levels*

School year: 2006/2007

Developed for: Southlands Elementary School, Vancouver School District

Developed by: Linda Hanson (scientist), Joanna Wood and Elizabeth Robertson (teachers)

Grade level: Presented to grades 1 - 2; appropriate for grades 1 - 5 with age appropriate modifications.

Duration of lesson: 1 hour and 15 minutes

Notes: If possible, students should be taken for a short walk in the forest prior to the lesson. If it has not been covered in class previously, students should be introduced to the concept of living and non-living organisms with discussion of how their interactions shape an ecosystem.

Worksheet note: There is a worksheet and photos specific to this lesson.

The termite photo is from <<http://www.bugwise.net.au/guide/termites.htm>>, BugWise, Invertebrate Guide, Termites. Website hosted by the Australian Museum. Accessed March 25, 2007.

The earthworm photo is from <<http://www.nrri.umn.edu/worms>> Great Lakes Worm Watch. Website hosted by the University of Minnesota. Accessed March 25, 2007.

Objectives

1. Introduce the temperate rainforest ecosystem.
2. Review the living and non-living components of an ecosystem.
3. Introduce the concept of producers, consumers and decomposers in the context of an ecosystem.

Background Information

The primary biogeoclimatic zone on the Pacific Northwest Coast is the temperate rainforest. Temperate rainforests are rich in biodiversity providing a home for a wide variety of plants and animals (see partial list at end of lesson). The relatively mild and wet climate of the Pacific Northwest is characteristic of temperate rainforests. The biotic (living) components of the ecosystem can be broken down into three trophic levels based on how they obtain energy, producers, consumers and decomposers. Some organisms clearly fit in a single category while others may straddle the border between two categories. For example, depending upon the species, snails may be either consumers (eating plants) or decomposers (eating dead organic matter).

Vocabulary

Ecosystem: An independent community consisting of both living (biotic) and non-living (abiotic) components and the interactions between them.

Producer: An organism that obtains its energy from the sun or another abiotic source.

Consumer: An organism that obtains its energy by eating other living organisms (either plants or animals).

Decomposer: An organism that obtains its energy from detritus.



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Detritus: Dead or decaying organic matter (small pieces of dead plants and animals).

Materials

- Laminated pictures of producers, consumers and decomposers (see list at end of lesson)
- Examples of forest objects (plant cuttings, tree seedlings, cones, decaying wood, fungi, insects, display animals)
- Pictures or slides of the three types of forest ecosystems.

In the Classroom

Introductory Discussion

1. Briefly mention and use pictures to illustrate the different types of forests (Tropical rainforest, Temperate rainforest, Boreal forest)

Tropical rainforests – found in warm, wet tropical areas of the world (ask for examples of where it might be found). Rainforests are home to more types of plants and animals than any other ecosystem. Wildlife includes monkeys, snakes, jaguars, many types of birds, and lots of bugs!

Boreal forests – found in cold, northern areas with long winters (ask for examples). Made up mostly of coniferous trees. Also contains lots of moss and lichens. Wildlife includes elk, caribou, lynx and wolverines.

Temperate rainforests – found in areas with moderate climates (cold winters and hot summers) and lots of rainfall. Contains both coniferous trees and deciduous trees. Wildlife includes deer, black bears, chipmunks, squirrels, woodpeckers.

2. Focus in on the temperate rainforest. Ask the students to list living and non-living components of this ecosystem. Write the suggestions on the board. Using the classroom as an example explain the concept of an ecosystem: there are living (students, teacher) and non-living (desks, pencils, floor etc.) components and in order for the system to function properly each part depends on the others.
3. To help introduce the concept of trophic levels discuss how different animals have different roles in the ecosystem. Define and explain the importance of producers, consumers and decomposers within the forest ecosystem. For example, without decomposers it would only take a few months for the entire world to be piled deep in garbage! Are you a producer, consumer or decomposer?
 - What are some producers, consumers and decomposers that we might find in the forest? What organisms have you seen on the school grounds (adjacent to the forest)? Write the student's answers on the board.
4. Summary of instructions for science experiment/activity.
 - If the desks are not already arranged in groups, split the class into groups of four.
 - Hand out the laminated producer, consumer and decomposer cards.
 - Have the students sort the cards into trophic levels.
 - Have the students draw and label some examples on their worksheets.
 - They can work from memory or examine the objects that have been brought into the class.



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Closure Discussion

1. Ask students what they think would happen if one of the trophic levels was missing from their ecosystem. If the sun suddenly stopped shining, what consequences would this have for plants? deer? bears? pill bugs?

References

1. Varner, Collin. 2002. Plants of Vancouver and the Lower Mainland. Raincoast Books.
2. National Geographic. Field Guide to the Birds of North America. 2002. National Geographic.
3. Haggard, Paul and Judy Haggard. 2006. Insects of the Pacific Northwest. Timber Press Inc.
4. Eder, Tamara and Donald Pattie. 2001. Mammals of British Columbia. Lone Pine Publishing..

Extension of Lesson Plan

1. Producer, consumer, decomposer game with bean bags.
2. Watch "All about forest ecosystems" DVD.

Resources

3. Stuffed (taxidermy) animals can be borrowed from the Cowan Vertebrate Museum in the Department of Zoology at the University of British Columbia. Email vertmus@zoology.ubc.ca.
4. Insect displays can be borrowed from the George J. Spencer Entomological Museum in the Department of Zoology at the University of British Columbia. Contact: www.zoology.ubc.ca.



A partial list of organisms found in the temperate rainforest

PRODUCERS

TREES

Western Hemlock
Western redcedar
Bigleaf Maple
Black Cottonwood
Red alder
Vine maple
Douglas-fir
Sitka spruce
Paper birch
Cascara

Ferns (sword, lady, deer, bracken, spiny wood)
Salmonberry
Blackberry
Blueberry
Huckleberry
Elderberry
Salal
Oregon grape
Indian plum
Devil's club
Indian-plum
Skunk cabbage
Moss (many, many species!)

CONSUMERS

MAMMALS

Black-tailed deer (subspecies of mule-tailed deer) - herbivore
Black bear - omnivore
Cougar/mountain lion/puma - carnivore
Bobcat - carnivore
Coyote - carnivore
Gray wolf – carnivores
Red fox - omnivore
Raccoon - omnivore
Skunk – omnivore
Weasel – carnivore/omnivore
Mink - carnivore
Mouse - omnivore
Vole - herbivore
Squirrel (Douglas, grey) - omnivore
Chipmunk – omnivore
Bat - carnivore

BIRDS

Bald eagle
Woodpecker (red breasted sapsucker, pileated)
Junco
Chickadee
Sparrow
Crow (American, northwestern)
Wren (winter)
Hawk
Jay (grey, Stellar's)
Owl (saw whet, screech, barred...)

INVERTEBRATES

Ladybird (ladybug)
Stinkbug
Bee/wasp
Butterfly/moth
Dragonfly
Grasshopper
Cricket – can be decomposer
Centipede
Spider
European black slug – can be decomposer
Snail – can be decomposer
Millipede – can be decomposer
Ant – can be decomposers

DECOMPOSERS

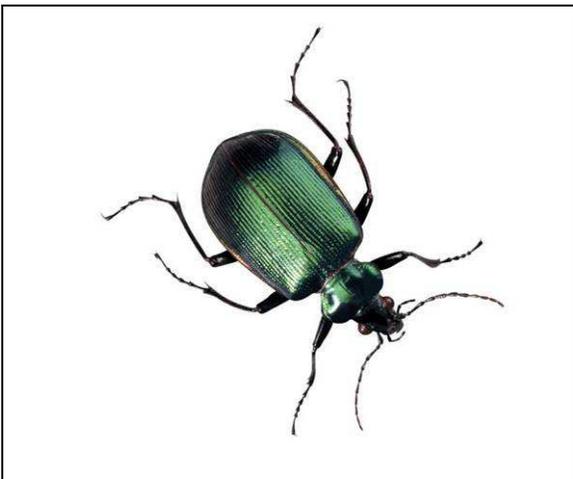
INVERTEBRATES

Banana Slug
Pill bug
Beetles (larvae)
Flies (larvae)
Crane flies (larvae)
Earthworm
Earwig
termite

FUNGI

Mushrooms
fungi

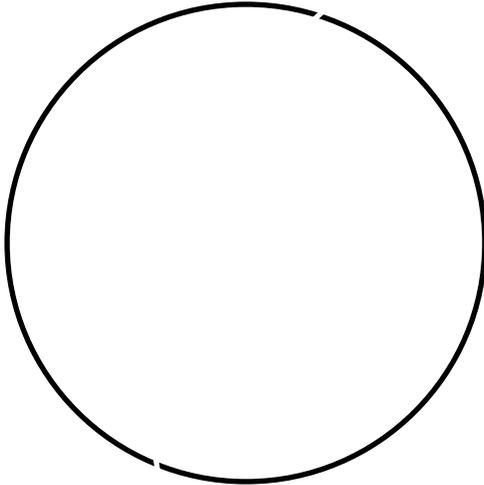
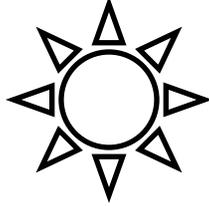




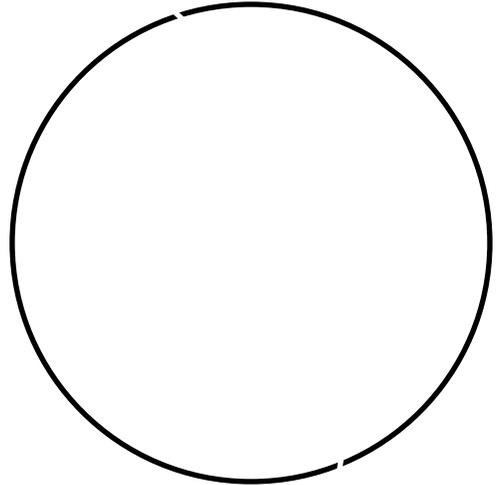
Scientist: _____

Date: _____

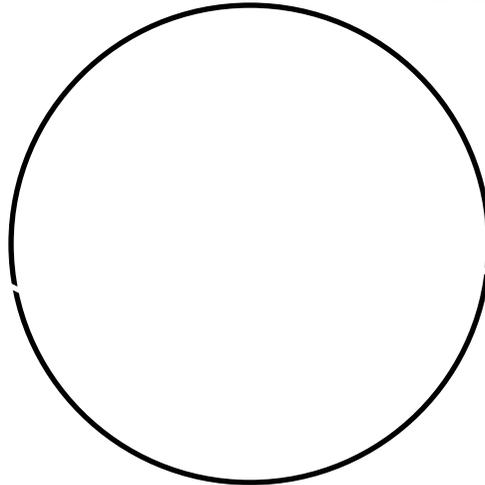
Producers, Consumers and Decomposers



PRODUCER



DECOMPOSER



CONSUMER

Producers use the _____ to make food.

Consumers eat _____ or _____.

Decomposers eat _____.

Detritus is dead _____ or _____.

plants	animals	sun	animals	plants
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