



Science Unit: *Plants 'n' Bugs*

Lesson 4: *Bugs in the Woods*

School year: 2008/2009

Developed for: False Creek Elementary School, Vancouver School District

Developed by: Shona Ellis (scientist), Angela Cotter and Geraldine Miles (teachers)

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

Duration of lesson: 2 hours

Notes: There are many ways in which this lesson can be modified. Introduction to key concepts should be introduced in the classroom so there is reduced cognitive load on the students during the field activities.

Objectives

1. Identify the insects and signs of insects in the forest ecosystem.
2. To introduce plant diversity.
3. To examine the role of insects in the forest ecosystem.
4. To understand the complexity of interactions in an ecosystem and construct a food web.

Background Information

Students have examined isolated relationships between insects and plants. A fieldtrip in the forest offers them a chance to apply what they have learned into a natural system. In the forest they will see evidence of pollination (either in action or in the fruit that has been produced). Students will also see insects' role in nutrient cycling and decomposition as detritivores (e.g. pillbugs beneath rotting wood). Some insects eat plants or plant products (primary consumers), while others consume animals such as other insects, worms, etc (secondary/tertiary consumers). Insects are an important food source for many organisms. Woodpeckers or their marks are a common site as they peck for insects beneath the bark of dead/dying trees.

Interactions between other groups of organisms will also be examined which will culminate in the development of a food web.

Vocabulary

Bark

Carnivore An organism that gains its nutrition from animals

Commensalisms A type of symbiosis where one organism benefits and the other is unaffected

Cones The pollen or seed producing structure of a conifer

Consumer An organism that gains organic molecules from other organisms (include primary, secondary, and tertiary)

Deciduous A plant that loses its leaves during the winter

Decomposer An organism that feeds on and breaks down dead animal or plant material (usually refers to fungi and bacteria)



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<u>Detritivore</u>	An organism that feeds on and breaks down dead animal or plant material (refers all organisms from bacteria to snails)
<u>Evergreen</u>	A plant that does not lose its leaves in the winter
<u>Herbivore</u>	An animal that consumes plants
<u>Mutualism</u>	A type of symbiosis where both benefit
<u>Needles</u>	Leaves that are elongate and narrow
<u>Omnivore</u>	An organism that gains its nutrients from plants and animals
<u>Parasitism</u>	A type of symbiosis where one benefits to the detriment of another
<u>Pollinator</u>	An organism that transfers pollen from an anther to a stigma
<u>Producer</u>	An organism that generates its own organic molecules
<u>Sap</u>	Exudates of a plant
<u>Scale leaves</u>	Leaves that are small and scale-like
<u>Spores</u>	A reproductive structure that is adapted for dispersal and desiccation tolerance for extended periods of time (mosses and ferns are good examples)
<u>Symbiosis</u>	An intimate interaction between two organisms

Materials

- Hand lenses or magnifying glasses
- Clipboard
- Pencil
- Fieldtrip Booklet

In the Field

Introductory Discussion

1. Fieldtrip Introduction Discussion:
 - What is a forest?
 - What are some rules that we must follow when we go into the woods?
2. Other items to discuss or review.
 - Introduce the concept of interactions – good and bad.
 - Where are we going to look for insects (or their relatives)?
3. Science activities:
 - The fieldtrip will have stations where students will see different organisms and learn key ecological concepts. They will play a game in partners that will lead to the construction of a foodweb.
4. The students will make observations and apply concepts and details they have learned in the classroom into a natural setting. They will also experience the forest ecosystem and identify the interactions between the organisms that live here.
5. Safety guidelines.
 - Sunscreen, appropriate footwear, long pants are required.



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Science Activity

Activity Title: Bugs 'n the Woods

Purpose of Activity: To give the students first hand opportunity to see insects in an ecosystem and consider how they interact with other organisms including plants.

Methods and Instructions:

A preliminary visit to the site is necessary. Signs of insect activity should be noted as well as signs of other animals, interactions between organisms, and key places on the trail for stopping, observation, and discussion.

A number of such stations should be identified and if possible marked. Each student will have a booklet with activities that correspond to some of the themes of the walk. The students will be in groups of five (parents may volunteer to participate or keen highschool students). The theme of the program this fieldtrip is "Plants'n'Bugs, but other ecological concepts will be introduced.

Part 1 - Forest Walk

Trail Etiquette

- Before entering a trail, trail etiquette, but be presented and emphasized

Instructions should include:

- do not go off the trail
- stay with your leader
- what you take in your bring out – no littering
- no dismembering organisms including plants

Booklet Activities – the order will depend on what you find in the woods, but it is good to end with the "game" and the foodweb.

As walking in the woods bring up the features of the forest ecosystem, the interactions between organisms, and the identification of a few choice examples (so not overwhelming).

- Ask students how many different types of plants they see?
(ferns, moss, conifers, flowering plants)

Symbioses in the woods

- close associations between organisms (usually 2)
- emphasize the importance of understanding interactions

Types of symbioses:

mutualism – both benefit

- pollination – plants and animals
- mycorrhizae (fungi and plant roots)

parasitism – one benefits the other is harmed

- on plants: aphids, spit bugs, some fungi

commensalism – one benefits, while the other is unaffected

- moss on a tree

Note: You can use alder as a good example of mutualism (bacteria in roots fix nitrogen that the tree can use, alder provides sugars to the bacteria)

Booklet Activity:

- Ask students if they know: herbivores, detritivores, carnivores, omnivores
- Define detritus (bodies or fragments of dead organisms)
- What is another important components of an ecosystem?



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Abiotic – nonliving
water, minerals, temperature, light

Example of Station - Douglas-fir (Pseudotsuga menziesii)

- review general conifer structure and reproduction
- needles (are leaves)
- cones have cool mouse bum shaped bracts.

Booklet Activity – (Douglas-fir box) – Example of how to complete box

- Bark – yes and very thick and craggy
- Broad leaves – no...they are long and narrow
- Deciduous – no, doesn't lose leaves, keeps leaves all year round
- Evergreen – yes, keeps leaves all year round.
- Conifer – yes, cone-ifer
- Flowering – no....it makes cones
- Needles – yes, long pointy leaves
- Fruit – no, remember fruit comes from an ovary which is part of a flower.....conifers do not have flowers and therefore no ovary.
- Scale leaves – no
- Spores – for our purposes.....no
- Tree – yes, it is tall.

Example of Station – Nurse Log

A log with a number of organisms growing on it.

Why is it called a nurse log?

- provides nutrients that help other organisms grow
- discuss role of fungi and bacteria in breaking down wood (tough stuff)
- other organisms are important too:
 - moss retains moisture that helps decomp
 - pill bugs chew up decaying wood (life log and find a few to show kids)
 - roots of trees also break the wood into smaller pieces.

Example of Station – Conifers vs. Flowering Plants

Bigleaf maple is a flowering plant; write down your observations as well as complete the appropriate box in the booklet..

Example of Station - Spit Bugs:

- not true bugs
- the spit or spittle bug produces a foamy froth which it then sits inside protected from predators and also lays eggs here.
- It usually forms the "spit" at a node between the stalk and a branch of a plant.
- There the bug resides and inserts its proboscis in order to suck the plants juices (sap)
- Water from the plant sap is excreted as watery feces, to which they add a thickening secretion and blow air bubbles into. The air bubbles produce a froth that builds up to form a large mass, which eventually begins to condense very slowly.
- The insects are generally not numerous enough to cause any real problems
- Using magnifying lenses students can look in the spittle for the bug, which may be either in adult form (with wings) or without wings (larva)

Example of Station - Big Red Cedar (Thuja plicata)

- ask what type of plant this is (conifer)
- general structure: roots, stems, leaves (scales)
- reproductive structures (there will be some seed cones to show them) – ask where pollen comes from (small cones)

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- bark – protects the inside of the tree – how is it different from Douglas-fir?

Importance to First Peoples:

- bark had many uses including clothing
- wood – important for canoes, poles, house planks, cooking pot, etc

Other stations could include

- fruits (berries of the woods)
- spore-producing plants (mosses, ferns)

2 - Food Web Game:

This component can be done in a clearing. Plants are the foundation as they take energy from the sun and convert it into food that other organisms can eat (primary producers).

Break up into groups of two (making up partners from different groups will prevent arguing)

- The partners stand back to back. One partner is given a card with the name of an organism. The student reads it, but does not tell his/her partner. The other student asks questions that can be answered by yes or no to find out if the organism is a producer, primary consumer, secondary consumer, or decomposer. Once they have done this then they ask questions to see if they can figure out what the organism is. The student with the card can only answer yes or no, but can give clues by imitating the animal (lots of fun).
- When they are done the other student will get a card and repeat.

Once everyone has had their turn they line up in rows based on their role in the ecosystem (producer, primary consumer, tertiary consumer)

It turns into a big mess (web). This demonstrates the intricate and numerous interactions between organisms.

The last page of the booklet is a paper version of this activity. This can be done as follow-up in the classroom and to review what they learned during the fieldtrip. Arrows are drawn from organism to what it consumes. Again we see a complex network that we call the foodweb.

References

1. Pojar, Jim and Andy MacKinnon (eds.). 1994. Plants of the Pacific Northwest coast. Vancouver, BC:

Extension of Lesson Plan

1. Food web activity in the booklet can be done in the class.
2. Reflection activity based on what was seen on the fieldtrip.

WALKIN' IN THE WOODS

Name: _____

INSERT ILLUSTRATION

2009

WALKIN' IN THE WOODS

Name: _____

INSERT ILLUSTRATION

2009

Symbioses in the Woods

There are many types of symbiosis:

Mutualism – both benefit

Examples: _____

Parasitism – one benefits to the harm of another

Examples: _____

Commensalism – one benefits, while the other is unaffected.

Examples: _____

Give examples

Detritivore/Decomposer:

Herbivore:

Carnivore:

Omnivore:

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Give examples

Detritivore/Decomposer:

Herbivore:

Carnivore:

Omnivore:

Producers, Consumers, and Decomposers

Use the following to fill in the blanks:

animals animals detritus detritus plants plants sun sun

Producers use the _____ to make food.

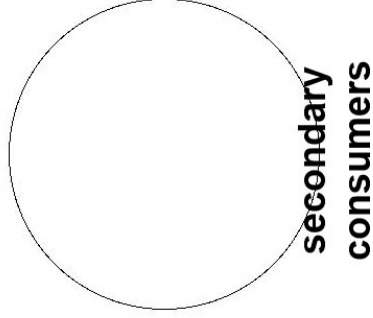
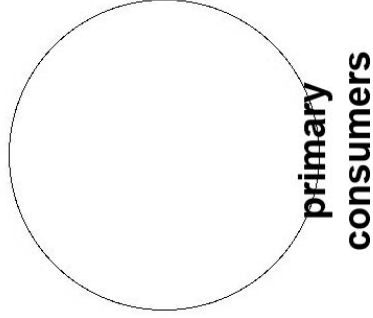
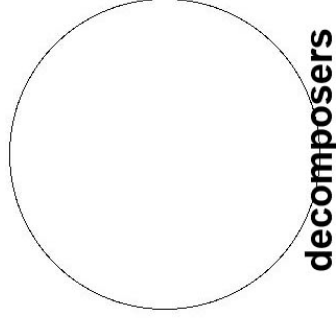
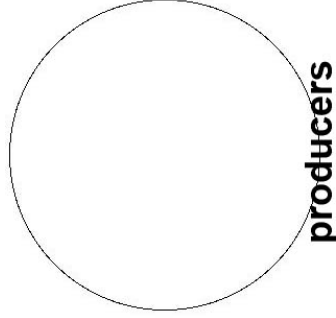
Primary consumers eat _____.

Secondary consumers eat _____.

Decomposers eat _____.

Detritus is dead _____ or _____.

Write at least two examples in each circle.



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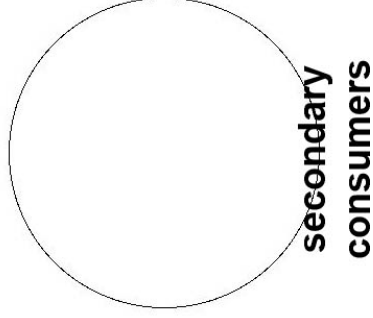
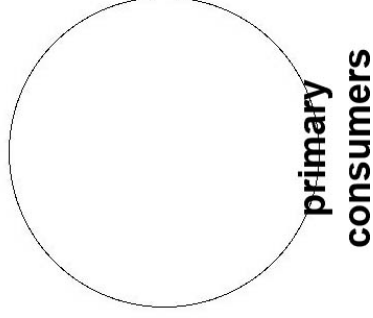
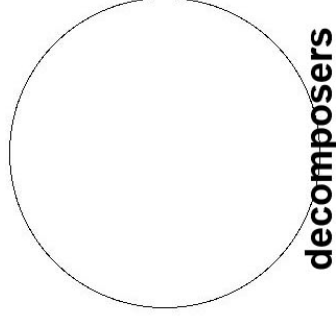
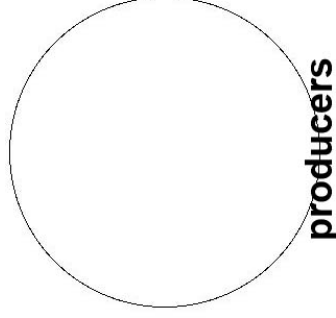
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Plants of the Forest

Use these terms to fill in the boxes:

bark, broad leaves, deciduous, evergreen, conifer, flowering, needles, fruit, scale leaves, spores, tree

Douglas-fir:	Bigleaf Maple:
Fern:	Western Red Cedar:

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Treasure Hunt – find an example of each of the following and draw or describe it.

Flower: _____	Fruit: _____
Conifer: _____	Insect: _____
Bird: _____	Mammal: _____

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Flower: _____	Fruit: _____
Conifer: _____	Insect: _____
Bird: _____	Mammal: _____

Food Web

coyote bald eagle dragonfly

ladybug frog squirrel crow spider

grasshopper bee spit bug

Producers:

hemlock	bigleaf maple	thimbleberry	sundew
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mushrooms banana slug earthworm termite pill bug

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