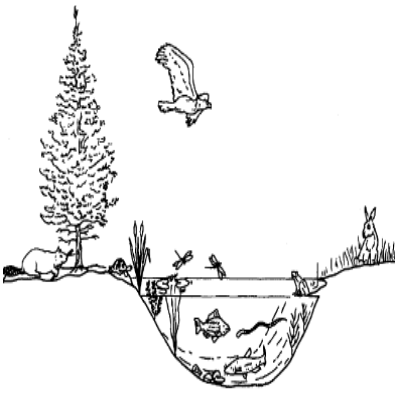
Lesson Plan Two - Ecosystems



Reference to: Understanding Life Systems, Interactions in the Environment

- **3.1** Demonstrate an understanding of an ecosystem 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.
- **3.3** Describe the roles and interactions of producers, consumers, and decomposers within an ecosystem.
- **3.4** Describe the transfer of energy in a food chain and explain the effects of the elimination of any part of the chain.
- **3.8** Describe ways in which human activities and technologies alter balances and interactions in the environment.

Resources

- Fly squatters or rolled up newspapers (optional)
- Table of words for Hit the Board plenary game (Teacher copy only)
- Ecosystems work sheet (class set)
- Food Chains work sheet (class set)

Summary

Students discuss what living things need to survive. They identify the abiotic and biotic components of an ecosystem and describe the roles and interactions of producers and consumers in food chains and food webs.

Vocabulary

- Abiotic factors
- Biotic factors
- Carnivore
- Consumer (primary, secondardy, tertiary)
- Decomposer
- Ecosystem
- Habitat
- Herbivore
- Omnivore
- Organism
- Predator (top)
- Producer
- Scavenger

Objectives

Students will:

- Understand what living things need to survive
- Will be able to name abiotic and biotic factors of an ecosystem
- Create a food web of a Great Lake ecosystem
- Understand the relationships between members of a food chain.

Background

A habitat is the place where an organism naturally lives and grows. An ecosystem is all of the interacting parts of a natural area, including biotic (living) and abiotic (non-living) factors. A mouse's habitat might be a field where it lives. The ecosystem would also include all of the plant and animal species in the field, as well as the precipitation, streams and soil.

In Lake Victoria, a cichlid's habitat would be the shallow shoreline water and rock formations where it lives. The lake ecosystem would include all of these things, plus all of the other interacting organisms in the lake (i.e. other plant and animal species) and non-living factors (i.e. sunlight, and the substrate of the lake bottom).

Starter Activity

What do we need to stay alive?

Description

In this starter activity students will think about what they need to stay alive and realise that all living things require the same basic things to survive. After you have discussed this fact, students complete section 1 of the **Ecosystems Worksheet** – recalling what all living things need to survive.

Instructions

1. Ask the students what they need to survive, they have one minute to write down as many things as they can think of (food, shelter, warmth, water, oxygen etc).
2. Discuss their findings, and the fact that all living things need the same things to survive (food, water, oxygen. Shelter and a habitat).

Use a Lake Victoria cichlid fish as an example:

a. **Food** - Different cichlids eat algae, insects, plankton, snails, etc.
b. **Water** - All cichlids need clean water.
c. **Oxygen** -.All cichlids need oxygenated water to breathe.
d. **Shelter** - Cichlids find shelter in vegetation and between rocks and sunken logs.
e. **Habitat** - Lake Victoria is an aquatic habitat for many species, including cichlids

3. Inform students that another word for anything that is alive (plants, animals, fungi, bacteria etc.) is an "**organism**".

4. **Students complete section 1 of the Ecosystems Worksheet.**

Main Activity - part one

Abiotic and Biotic Factors

Description

This activity is a teacher led discussion followed by section 2 of the **Ecosystems Worksheet**. It is designed to inform students what makes up an ecosystem, and to introduce them to important ecological terms – organism, ecosystem, habitat, abiotic factors and biotic factors.

1. **What does an ecosystem need to be balanced and healthy? Discuss these points with the students.**

- **Abiotic** (non-living) factors:
  i. Soil iii. Water
  ii. Air iv. Nutrients

- **Biotic** (living) factors:
  i. Plants iii. Fungi
  ii. Animals iv. Micro-organisms

2. **Students complete section 2 of the Ecosystems Worksheet.**

Main Activity – part two

Food Chains and Food Webs

Description

This is a teacher-led discussion, on food chains and food webs. Students will observe food chains being created, they will then answer questions on **the Food Chain Worksheet**, with regards to what different organisms at different levels of a food chain are called – **producer, consumer, top predator.**

Instructions

Food chains – introduce the idea of a food chain. Explaining that they all start with a ***producer***, usually a plant (which produces its own food via photosynthesis). Anything which eats something else is called a ***consumer***. Animals which only eat vegetation are called **herbivores,** animals which only eat meat are called **carnivores** and animals which eat both are called **omnivores.**

Draw some examples of food chains on the board, asking the students for ideas. The arrows represent the flow of energy, so will always point towards the animal which is eating and gaining the energy.

Examples include:

Lettuce → Rabbit → Fox

Grass → Zebra → Lion

Algae → Small fish→ Large fish →Sea lion → Shark

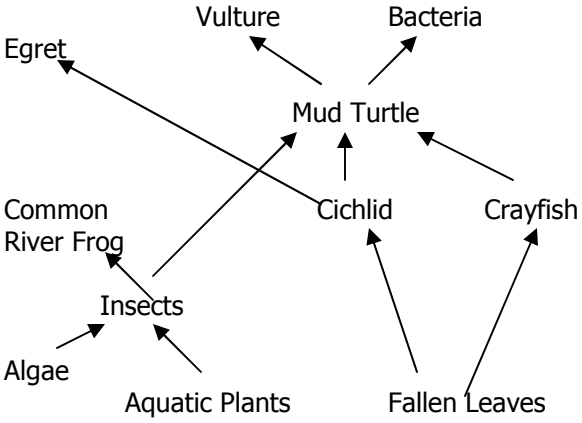
1. **The students are to complete questions 1 to 3 on the Food Chains Worksheet.**

2. **Go through the answers of questions 1 to 3 on the Food Chains Worksheet.**

3. **Discuss the fact that an organism may be eaten by more than one thing, and may eat more than one thing, hence, a web.**

Create a food web on the board using a lake ecosystem. Include several fish at different consumer levels. For example, algae could be a **producer**. An algae-eating insect would be a **primary consumer** (primary because it is the first organism to consume another organism, algae). A mud turtle would be a **secondary consumer** (because it eats the insects). This can go on for many levels. If the mud turtle dies, a **scavenger** (i.e. a vulture) might eat it, and micro organisms (**decomposers**) might break the rest of it down. Food webs begin with producers (plants), and end with decomposers.

***African* Example**:



4. **Students to complete question 4 of the food chains work sheet.**

5. **Write the animal names on the board, in the same location as on the Food Chains Worksheet. Get students to come up and add an arrow onto the diagram until the web is completed, with all 14 arrows.**

Plenary Activity

Hit the Board game

Description

This activity reinforces to students the difference between abiotic and biotic factors and gives them some examples of different habitats. It is a fast paced game that gives all students a chance to participate.

Instructions

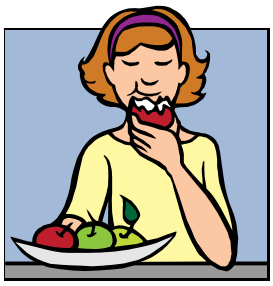
Hit the Board game – write the words, **habitat, abiotic** and **biotic** on the board as follows:

Abiotic	Biotic
Habitat	

- Two students come up to the front, and stand either side of the board.
- You say a word from the **Words for Hit the Board Game** sheet.
- The students have to race to hit the word which it relates to, they can use their hand, a fly squatter or a rolled up piece of paper.
- The winner is the one who hits the correct word first.
- The winner stays at the front, for the next round, the other student returns to their seat.
- Another student comes to the front and you say another word, the above is repeated.
- If the same student wins 3 times in a row, then they return to their seat and somebody else gets a turn (you could award a small prize if they manage to win 3 rounds in a row).

Ecosystems Worksheet

1. **Write a word under each of the pictures below to show what all living things need to survive.**



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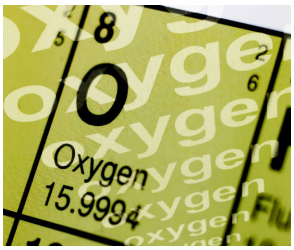

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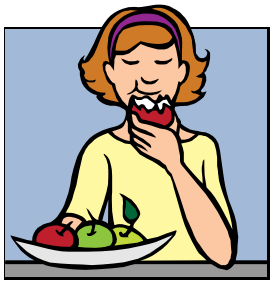
2. **Use the words at the bottom of the page to fill in the blanks:**

- Something which is alive, for example a plant or animal is called an ……
- A place where an organism naturally lives and grows is known as its …….
- An …….. is all the interacting parts of a natural area including abiotic and biotic factors.
- ……..... factors are non-living things including soil, air, water and nutrients.
- ……factors are living things found in an ecosystem and include plants, animals, fungi and micro-organisms.

Biotic **Ecosystem** **Organism** **Habitat** **Abiotic**

Answer sheet
Ecosystems Worksheet

1. **Write a word under each of the pictures below to show what all living things need to survive.**



FOOD

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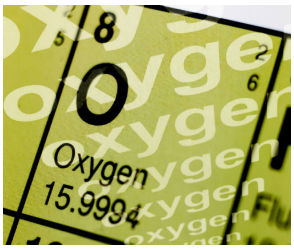

OXYGEN

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WATER

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SHELTER

……

HABITAT

……

2. **Use the words at the bottom of the page to fill in the blanks:**

- Something which is alive, for example a plant or animal is called an **ORGANISM**
- A place where an organism naturally lives and grows is known as its **HABITAT**
- An **ECOSYSTEM** is all the interacting parts of a natural area including abiotic and biotic factors.
- **ABIOTIC** factors are non-living things including soil, air, water and nutrients.
- **BIOTIC** factors are living things found in an ecosystem and include plants, animals, fungi and micro-organisms.

Name: _____

Food Chains Worksheet

Lettuce → Slug → Frog → Snake → Eagle

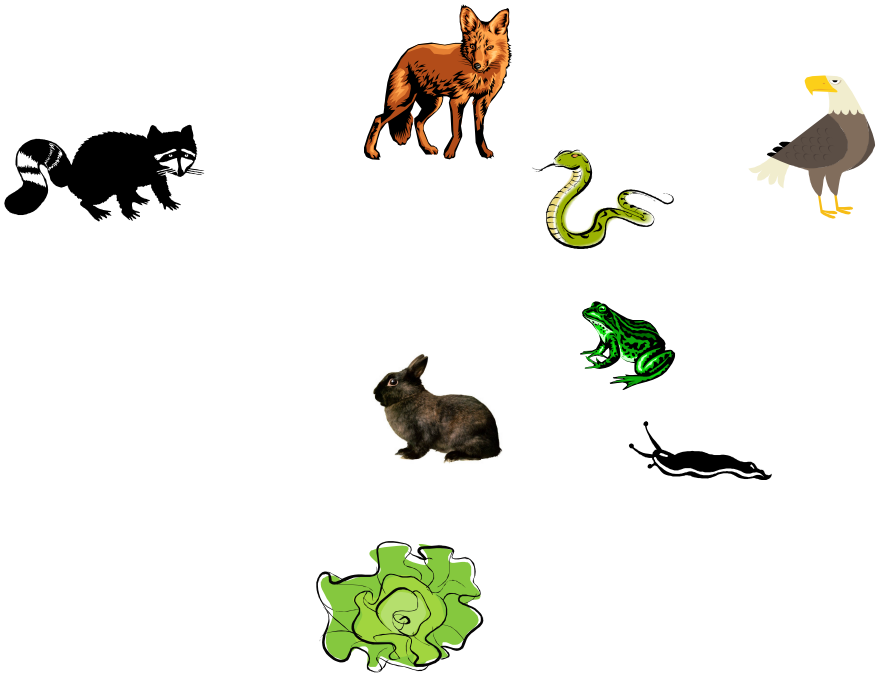
1. **Which organism is the producer?_____(1)**

2. **Which animal is the top predator?_____(1)**

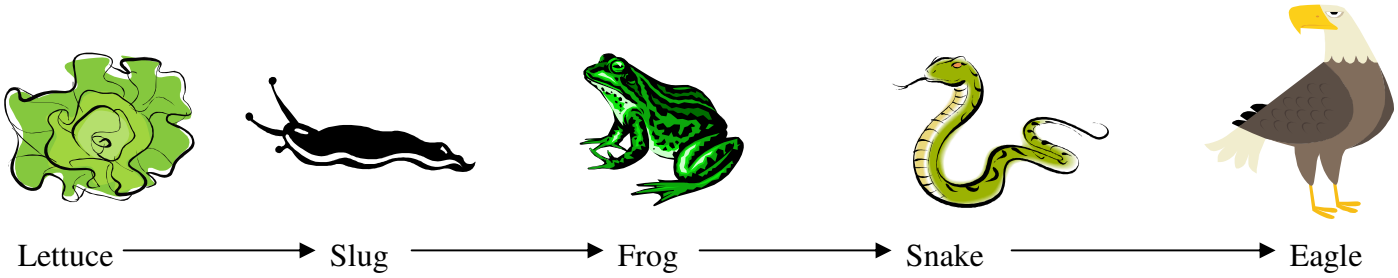
3. **Name the consumers in the food chain _____**

_____(2)

4. **Frogs are also eaten by racoons and eagles. Lettuce is also eaten by rabbits. Coyotes eat raccoons, snakes, and rabbits. Eagles eat snakes, rabbits and frogs. Draw in the arrows below to form a food web. (14)**



Answer sheet
Food Chains Worksheet

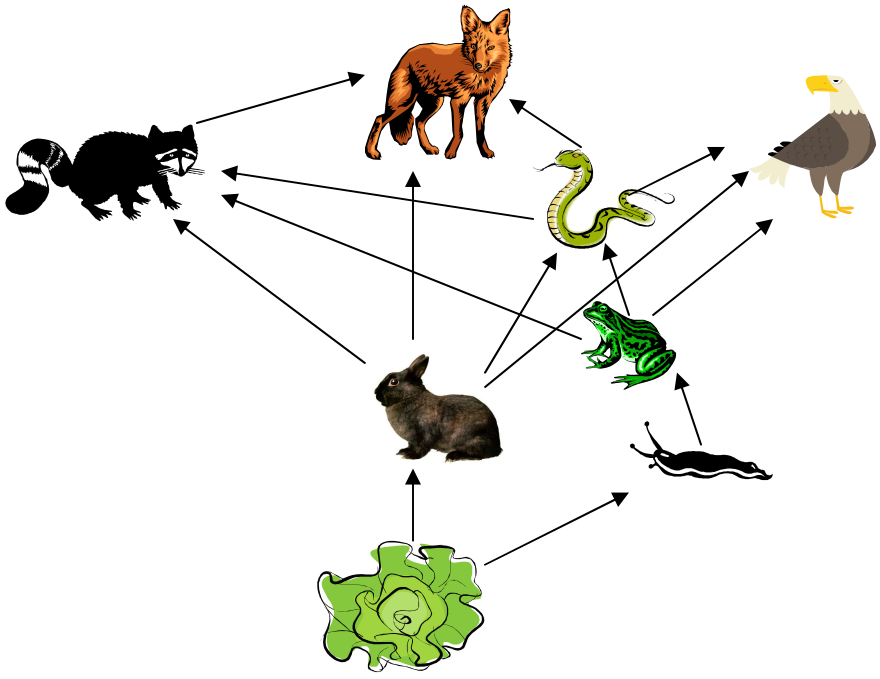


5. **Which organism is the producer?** **LETTUCE (1)**

6. **Which animal is the top predator?** **EAGLE (1)**

7. **Name the consumers in the food chain** **SLUG, FROG, SNAKE, EAGLE** **(2) Half mark/animal.**

8. **Frogs are also eaten by racoons and eagles. Lettuce is also eaten by rabbits. Coyotes eat raccoons, snakes, and rabbits. Eagles eat snakes, rabbits and frogs. Draw in the arrows below to form a food web. (14)**



Words for Hit the Board Game

WORD	ANSWER
Light intensity	Abiotic
Racoon	Biotic
Cave	Habitat
Producers	Biotic
Mountain	Habitat
Water content of soil	Abiotic
Consumers	Biotic
Dissolved oxygen levels	Abiotic
Forest	Habitat
Parasites	Biotic
Decomposers	Biotic
Meadow	Habitat
Temperature range	Abiotic
Field	Habitat
Predators	Biotic
Soil pH	Abiotic
Bird	Biotic
Marsh	Habitat
Humus content of soil	Abiotic
River	Habitat
Competitors for food	Biotic
Flower garden	Habitat
Desert	Habitat
Rainfall levels	Abiotic
Pond	Habitat
Plants	Biotic
Ocean	Habitat
Fungi	Biotic
Rate of water flow	Abiotic
School yard	Habitat
Disease causing microbes	Biotic
Rainforest	Habitat
Pollution concentrations	Abiotic
Lake	Habitat
Nutrient levels of soil	Abiotic
Wetland	Habitat
Stream	Habitat
Insects	Biotic