

# Grade 7 Science

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## Unit 1: Interactions within Ecosystems



# Chapter 1

## Types of Ecosystems

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### 1.1 Ecosystems

- We are surrounded by **biotic** (living) and **abiotic** (non-living) things. All animals, plants and micro-organisms are living things and biology is the study of these living things.
- Any living thing is referred to as an **organism**.

# Types of Ecosystems

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- Organisms are found in just about every place on Earth that you can imagine. From the coldest regions of Antarctica to the hottest undersea volcanoes.
- Each organism has adaptations that allows it to survive in its chosen environment.
- **Adaptations** are inherited characteristics that help an organism survive in its environment.

# Structural & Behavioural Adaptations

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## Structural

- All organisms have adaptations that help them survive and thrive.
- Some adaptations are structural. Structural adaptations are physical features of an organism like the bill on a bird or the fur on a bear.

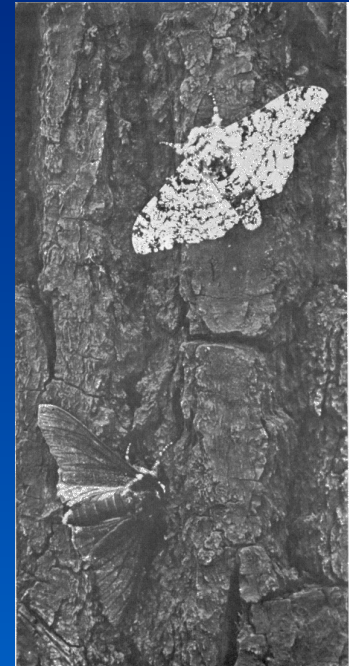


# Structural and Behavioural Adaptations

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## Mutations

- Adaptations usually occur because a gene **mutates** or changes by accident!
- Some mutations can help an animal or plant survive better than others in the species that don't have the mutation. Example is the peppered moth.



# Structural and Behavioural Adaptations

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## Behavioural

- Other adaptations are behavioral.
- Behavioral adaptations are the things organisms do to survive. For example, bird calls and migration are behavioral adaptations.



# Structural and Behavioural Adaptations

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## Structures for Getting Food

- All living things need energy to grow, reproduce & move. They get this energy from food.
- Different organisms have different ways of getting this food.
- Insects have many things in common like all having six legs. However, they each have very different mouthparts that allow them to get food from different sources.

# Types of Ecosystems

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## What is an Ecosystem?

- An ecosystem is all the biotic and abiotic factors of a particular environment.
- Each organism is suited to survive in their particular ecosystem.
- Ecosystems can be as large as an ocean or as small as a rotting log in the forest.
- Within one large ecosystem there maybe many smaller ones.
  - ▶ Ex. A forest ecosystem may have a smaller river ecosystem or a bog ecosystem.



# Types of Ecosystems

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## Biotic and Abiotic

- **Biotic** factors of an environment include all living (or dead, once had lived) things in that environment. From the largest elephant to the tiniest bacterium.
- **Abiotic** factors include all the non-living things in the environment such as air, water, rocks & minerals and sunlight. These factors were never alive to begin with.

# Reading Check

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- P. 9 #1 - 4
- Define the following terms: (provide an example to show that you understand the meaning)

Adaptation

Ecosystem

Biotic

Organism

Abiotic

Habitat

# Types of Ecosystems

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## Ecosystems of Atlantic Canada

- 1. Coastlines and Oceans
  - ▶ Long stretches of rocky coastline, sometimes covered in saltwater and other times exposed to air as the tide moves out.
  - ▶ Organisms found on the coastline (seaweed, barnacles, mussels) are able to attach to the rocks to keep from being washed away by the waves.
  - ▶ Organisms found in the ocean must be able to adapt to cold temperatures, moving currents and water salinity (saltiness).

# Types of Ecosystems

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- - ▶ Many organisms have the capability of swimming (cod, seals and whales) while others just drift with the moving currents (jellyfish and plankton).
  - ▶ Sunlight can only penetrate to about 100m to 200m. Even though plants cannot survive below these depths, there are many organisms such as bacteria and certain animals that are adapted to live here.



# Types of Ecosystems

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## ■ 2. Freshwater Ecosystems

- ▶ This includes rivers, lakes and ponds
- ▶ They get their supply of freshwater from rain and snow
- ▶ Whether an area is dry or muddy after a rainfall depends on the type of soil and rock found in the ground
- ▶ Some plants like a very wet soil, such as tamarack and willow trees
- ▶ In this type of ecosystem, there are many habitats for animals such as trout, beavers, ducks, loons, frogs, insects and various water dwelling plants.

# Types of Ecosystems

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## ■ 3. Arctic

- ▶ This ecosystem has very low temperatures and very little precipitation... it is basically a cold desert.
- ▶ During winter the nights are long and days are short... the opposite happens in the summer.
- ▶ About one metre below the surface is *permafrost*... permanently frozen ground.
- ▶ There is not enough moisture to support the growth of trees, only low shrubs, mosses, lichens and small flowering plants.
- ▶ Animals found in the Arctic include caribou, wolves, lemmings, polar bears
- ▶ Birds fly north in summer to mate and south in the winter since it is too cold for them to survive.

# Arctic Animals

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# Types of Ecosystems

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## ■ 4. Forests

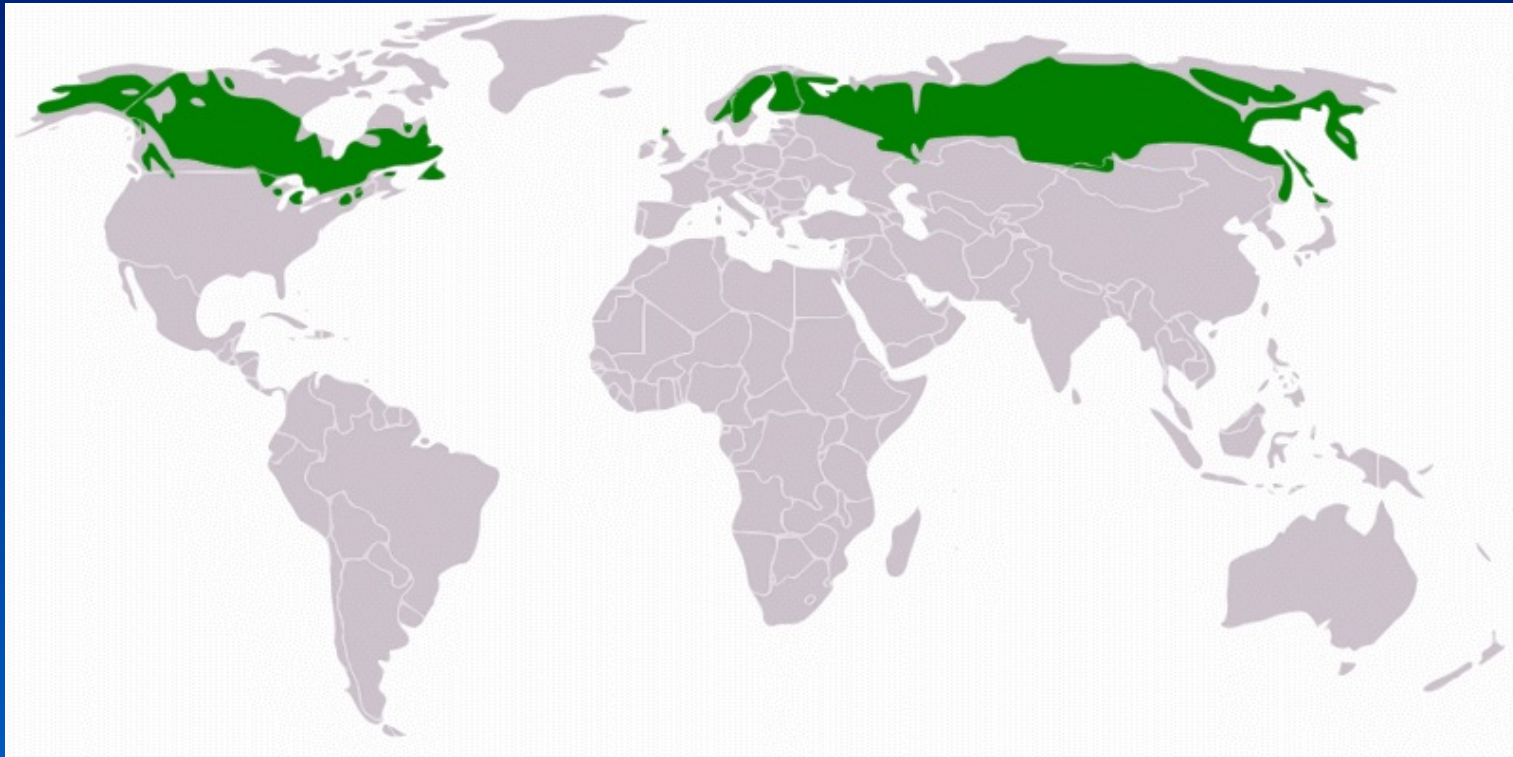
- ▶ There are many types of forest ecosystems
- ▶ Newfoundland and Labrador is mostly Boreal forest also known as Taiga.
- ▶ The type of forest is named based on the type of vegetation that grows there (plant life)
- ▶ The type of vegetation is determined by the abiotic factors of the region ex. Soil type, rainfall, amount of sunlight and temperatures
- ▶ Poorly drained areas sometimes become bogs or marshes. Dead plant material decays very slowly here and the build-up of dead plant material can sometimes produce peat.



# Types of Ecosystems

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## Boreal/Taiga Forest



# Types of Ecosystems

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All living organisms require 4 things in order to survive.....

1. Air
2. Water
3. Food
4. Suitable habitat

Adaptations occur genetically by chance - if it helps an organism to survive, the characteristic is passed on to its offspring.

# Types of Ecosystems

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## Ecosystems of Atlantic Canada

- Reading Check P. 12 # 1-4
- Checking Concepts P. 15 #2, 3, 6, 7, 10, 11

## 1.2 Abiotic Parts of Ecosystems

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- Organisms require certain conditions in order to survive in a particular ecosystem.
- Too much light can cause leaves on a plant to burn, not enough and the leaves turn brown.
- Too much water and roots will rot, too little and leaves droop and the plant will die
- Some plants like soil acidic while others do not.

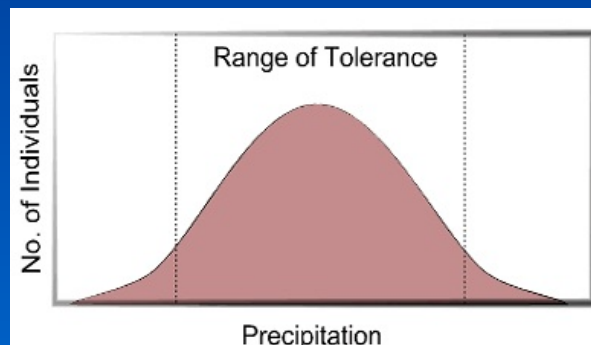


# Abiotic Parts of Ecosystems

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## 1. Range of Tolerance

- Every population of organism lives best in an ecosystem that has an acceptable range of abiotic factors.
- If this range goes too high or low, you will find less and less numbers of these organisms.
- The range of abiotic factors that is best for organism survival is called their **Range of Tolerance**.



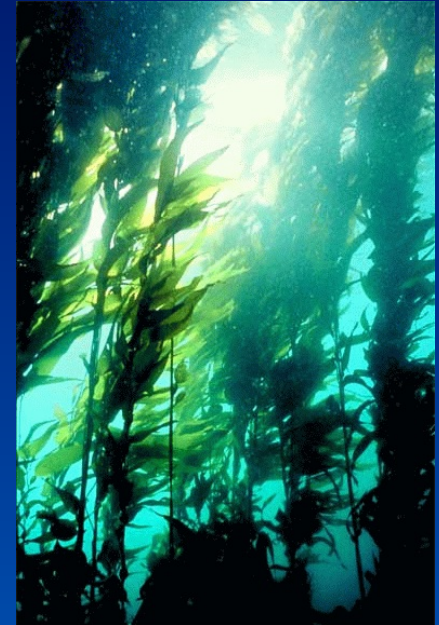
P. 17 #1,2

# Abiotic Parts of Ecosystems

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## Abiotic Influences - 1. Light and Light Intensity

- All green plants and algae depend on light from the sun to carry out **photosynthesis**.
- The amount and intensity of light in an area will determine the type of plants that will grow there
- Seaweed and fresh water plants can grow at or near the surface of the water. However, below 200 meters, there is no light and, therefore, outside the range of tolerance for plants.



# Abiotic Parts of Ecosystems

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- Unlike plants, many animals live in low light or no light conditions
  - Example - caves, deep ocean, in the soil
- Some of these animals sleep during the day and only come out at night.
- These animals have special adaptations to make them more functional in conditions of low light.
  - Sense of hearing, touch or smell are better than normal

# Abiotic Parts of Ecosystems

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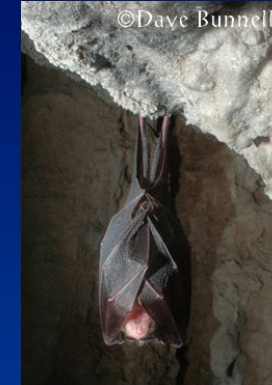
## Abiotic Influences - Light and Light Intensity



Grotto Salamander



Texas Blind Salamander



Vampire Bat



Giant Isopod



Corolla



Angler Fish



# Abiotic Parts of Ecosystems

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## Abiotic Influences- 2. Temperature

- Animals that cannot regulate their internal body temperature are referred to as cold-blooded.
- Their internal body temperature becomes whatever the outside air or water temperature happens to be.
- As a result, the activity level and even where they live is determined by temperature
- Even the growth rate of micro-organisms, such as bacteria, is determined by temperature.
- Plants, such as strawberries, will only produce fruit when the temperature is warm enough.

# Abiotic Parts of Ecosystems

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## Abiotic Influences - 3. Soil

- Soil consists of biotic and abiotic components.
  - ▶ Biotic parts are decomposing dead plants and animals as well as waste products they excrete
  - ▶ Abiotic parts rock materials, air, water, acidity
- The type of soil will affect the type of animal and plant life that can live in it
- Insects and worms burrow through the soil, loosening it by creating air pockets. This, in turn, allows for better water absorption and it also makes it easier for plant roots to grow.
- The soil also provides an anchor point for plant roots.

# Abiotic Parts of Ecosystems

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## Abiotic Influences - 4. Air & Wind

- Animals use oxygen from air for **respiration**
- Plants use carbon dioxide for **photosynthesis**
- Many animals, such as birds, insects and bats, fly through the air.
- Wind is important for plants that distribute their seeds in this way ex. Dandelion seeds
- Along coastlines, wind can be strong and frequent. This will dry out the soil and often send a salty spray over the land. Plants that live here must be adapted to dry soil and higher than normal salt content.
- Lichens have a high tolerance for salt and are often found growing on rocks along the coastline.

# Abiotic Parts of Ecosystems

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## Abiotic Influences - 5. Water

- Every living thing requires water to survive.
- Some organisms live in water, while other organisms hunt for their food in water. However, all organisms **MUST** consume water.
- There are some organisms that have a wider range of tolerance for water than others and can therefore live in very dry conditions for a long time ex. Cactus
- Large bodies of water help to regulate air temperatures on land (sea breeze and land breeze)
- Polar bears depend on ice to hunt seals in the spring.

# Checking for Understanding

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P. 19 # 1,2

P. 23 # 1-6 and 8, 9

## 1.3 Biotic Parts of Ecosystems

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- Ecosystems include many different species of organisms.
- A **species** is a group of organisms that can reproduce among themselves to produce offspring of the same type that can also reproduce successfully.
- A dog can mate with another dog but not a cat... because they are two different species.

# Biotic Parts of Ecosystems

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## Levels of Organization

- A single member of a species is called an **individual**.
- An entire group of individuals that live in the same ecosystem at the same time are called a **population**.
- In any ecosystem there are many different populations of animals and plants.
- The interaction of these different populations is called a **community**.
- The interaction of all the biotic and abiotic factors of an area is called an **ecosystem**.

# Biotic Parts of Ecosystems

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- Within any community, each species interacts with the biotic and abiotic factors differently.
- For example, ducks eat waterweeds and mosquito larvae while the kingfisher eats fish.
- Some plants grow at the surface of the pond while other are rooted at the bottom.
- The role a species has, including where it lives, how it obtains its food, and how it affects its environment is called its **niche**.
- If two species have the same niche, they are in competition and one of the species will die off.



# Types of Interactions in Ecosystems

- The biotic and abiotic parts of the environment interact together in many different ways.
- As you breathe you are interacting with an abiotic part of your environment... the air.
- Plants are affected by temperature, rainfall, soil type and amount of sunlight... all interactions with the abiotic part of their ecosystem.
- An animal eating a plant is one biotic part interacting with another biotic part of the ecosystem.
- Even two abiotic parts can interact - the sun drying out a mud puddle is an example.

# Dichotomous Keys

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- Dichotomous Keys - is a special identification key that is used to identify already named organisms.
- Dichotomous keys are divided into two alternate statements at each step. The choice of one of the alternatives determines the next you choose for naming.
- Scientific name has two parts - a Genus name and a species name. *Homo sapien*

# Checking for Understanding

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P. 29 # 1,4,5,7,8,9

P. 30 # 1,2,4-8, 12,16,18, 20

# Dichotomous Keys

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A dichotomous key - is a scientific method used to identify organisms. This key is divided into 2 statements, which offers 2 alternatives at each step. The statement chosen actually determines the next step in the identification process.

Species has a scientific name - 2 parts (genus, species) Example - *homo sapien* - scientific name for human.

P. 26 and dichotomous key activity