**Unit 2: Ecology**

**What is ecology?**

Ecology involves organisms (biotic part) and their non-living environment (abiotic factors), as well as studying the interaction between them.

**Biotic factors** include plants, animals, fungi and other organisms.

**Abiotic factors**  include climate, soil, temperature, water, air, sunlight, humidity, atmospheric gases, etc.

A **habitat** is the geographical location where animals and plants live in.

**Key definitions**

* **Population –** a group of organisms living in one place, these organisms are able to interact and interbreed which each other i.e. they are from the same species.
* **Community –** consist of different populations which interact with each other.
* **Ecosystem –** refers to both the biotic and abiotic elements which are found in a specific environment.

**Energy flow in an ecosystem**

Each steps in the transfer of energy is known as a **trophic level.**

* **Food chain -** is where energy is transferred from one trophic level to another, often involving only one organism at each trophic level.
* **Food web –** most organisms eat more than one organism, when more organisms are involved in each trophic level it is known as a food web. This creates a complex interconnection of food chains in an ecosystem.

**Energy losses and efficiency of energy transfer**

When a lion eats a zebra it does not receive all the energy the zebra provides. As much of the energy obtained by the zebra is lost through:

* Waste
* Heat
* Movement
* Respiration, etc.

Thus only 10% of energy from one trophic level is transferred to the next – this is known as the 10% law.

**Endangered or Extinct**

**Endangered** species have a population that is very low in number making it unlikely (but not impossible) for them to repopulate and survive in the wild.

**Extinct** species are no longer found in the wild and have completely died out, e.g. dinosaurs.

**Types of ecological interactions**

There are four type of ecological interactions:

* Competition
* Cooperation
* Predation
* Symbiosis
  + Parasitism
  + Mutualism
  + Commensalism

**Competition**

Competition refers to the desire to be more successful than other organisms in obtaining scarce resources.

* **Intraspecific competition** – competition existing or happening with same species e.g. plants compete for space, sunlight, nutrients, etc.
* **Interspecific competition –** competition between different species e.g. hyenas and vultures can compete for the remains of dead organisms.

**Symbiosis**

Symbiosis is a close and often permanent association and relationship between two different species. There exist different types of symbiosis relationships.

* **Mutualism –** here both species benefit to some extent with neither species being harmed.

**E.g.** Ants and Aphids (a tiny insect which commonly found on plants). Aphids obtain their nutrients by sucking fluids from plant tissue, they then secrete sugars and other substances as waste. Ants eat this sugary substance gain vital nutrients from it. In this relationship, the aphids provide food to ants and because the ants rely on the aphids from sustenance the became caretakers – they provide aphids with security, transport from plant to plant and even care for aphids eggs. Here both parties benefit to some extent with neither species being harmed.

* **Commensalism –** one organism receives a ecological benefit from another organism, while the other organism neither benefits or is harmed.

**E.g.** Birds and squirrels nesting in trees and shrubs.

* **Parasitism –** similar to predation, where one organism benefits while the other is harmed, but unlike predation where the organism quickly kills and eats its prey the organism benefits by keeping its host alive for days or even years.

There are two types of parasitism relationships:

* **Endoparasitism –** is when the organism lives inside the hosts body.

**E.g.** A virus living inside humans.

* **Ectoparasitism –** is when the organism lives on the hosts body.

**E.g.** Ticks on cattle.