ecology

by

Samar nazer

Enpl236

Birzeit university

ENVIRONMENT ECOLOGY AND BIOSPHERE

- **Environment** The term environment denotes all the physical, chemical and biotic conditions surrounding and influencing a living organism.
- Favorable environmental conditions are required to sustain life on earth.
- The environment can be divided into two main components

1. Abiotic : All the physical (climatic), edaphic (nature of soil) and chemical factors. They are also called nonliving factors. The important abiotic factors are temperature, light, pressure, humidity, precipitation, wind, mineral elements of soil and composition of air. Some of these environmental factors serve as resources (air, soil and water) while others act as regulatory factors (light, temperature and pressure etc).

2. Biotic : All living organisms found in the environment and that includes plants, animals and microorganisms.

Ecology

- **Ecology** is the scientific study of the relationship between organisms and their environment.
- The term ecology is derived from a Greek word Oecologie where “oikos” meaning “household” and “logos” meaning “the study of”. Literally ecology is the study of organisms at home.
- This term was introduced for the first time by a German Biologist Earnst Haeckel in 1869. the study of relationship between living and non living things in the environment
- Charles Elton a modern Ecologist defined Ecology as the study of animals and plants in relation to their habit and habitat.
- Ecology deals with various forms of interactions between the organisms and their environment. These interactions can be studied at the various levels of organizations in the living systems starting from the molecules such as DNA (genes) to a biological community and the whole biosphere. Each step of independent interaction is called a level of organization.
- These are as follows :
- Genes → Cell → organ → organism → Population → Community

- At each level of organization there is a direct interaction of the physical system that is matter and energy.
- The study of ecology has presently contributed a lot to the socio-economic and political issues of the world as it plays an important role in agriculture, fishery biology pest control, conservation of soil, forests and water resources. All the international issues of environment such as pollution and resource management need a sound knowledge of ecology.

Levels of biotic organizations showing a direct impact of the environment

- An organism is a self reproducing system capable of growing and maintaining itself and is directly influenced by the surrounding environment.
- A population is an assemblage of similar organisms belonging to the same species, living together at one place at a given time.
- A population always has a specific place of its living which is known as its **habitat.** The habitat of sunfish is a pond and lion is a forest. The group of lions living in one forest or the group of sunfish living in one pond belong to one population.

Species and population

- A species is defined as a group of organisms which can interbreed and produce a successful offspring.
- These organisms may be separated in space and time into smaller groups called populations.

community

- **Biological community** refers to the populations of different species occupying a common place of living. For example all the living organisms in a pond belong to one community.
- A biological community along with its nonliving environment of energy and matter makes an **ecosystem** (as shown in the figure). **Ecosystem can range in size from** a puddle of water to a stream or a patch of wood to entire forest or desert.
- Synecology : is the study of groups of organisms in relation to their environment

Biosphere

- Biosphere: is a thin layer on and around the earth which sustains life.
- Life exists in the diverse forms of living organisms. All these living organisms of the biosphere are directly or indirectly dependent on one another as well as on the physical components of the earth.
- The three physical components of the earth are **atmosphere, lithosphere and hydrosphere (air, land and water).**

- The **atmosphere** is a gaseous envelope surrounding the earth's surface, It is made up of nitrogen, oxygen,argon carbon dioxide and many other gases in very small amounts.
- **Hydrosphere**: is all the water supply to the earth which exists as liquid, vapour or frozen form of fresh and salt water.
- **Lithosphere:** comprises the soil and rock of the earth's crust.
- Recently the term **ecosphere** is being used more commonly. It is used to denote **biosphere** (living components) along with its **three abiotic** components –**atmosphere, hydrosphere and lithosphere** of the earth as one entity (unit).
- Ecosphere = Biosphere + Lithosphere + Hydrosphere + Atmosphere

- ecosphere is the largest worldwide ecosystem.
- Ecosphere is very huge and **can not** be studied as a single entity. **It is divided into many distinct functional units called ecosystem.**

Levels of Organization in Ecology

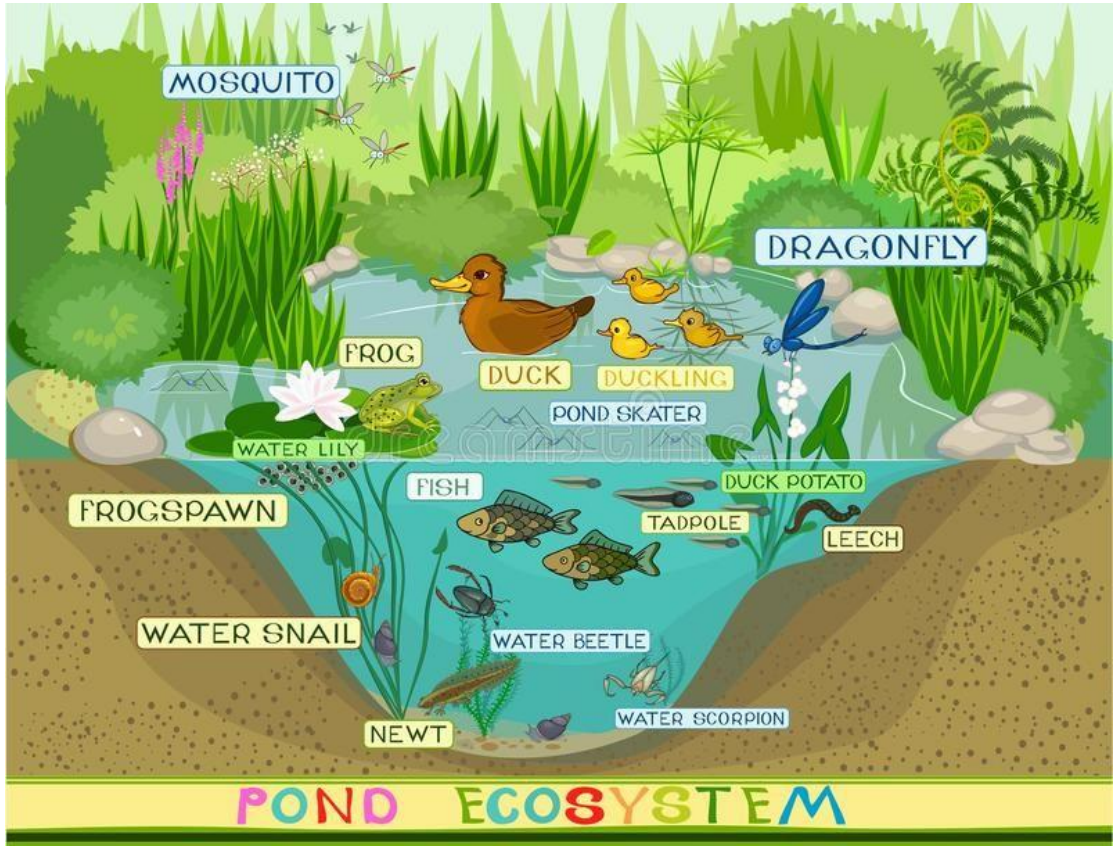
- Biosphere
- Biome
  - Ecosystem
    - Community
      - Population
        - Organism – organ, cell, genes

Interactions among living things and abiotic factors

- Ecosystem: interaction of populations in a community and nonliving (physical) surroundings
- Three kinds of ecosystems
  - Terrestrial (land)
  - Fresh water
  - Marine: 75% of the earth

Organisms in Ecosystems

- Habitat: place where an organism lives its life (home)



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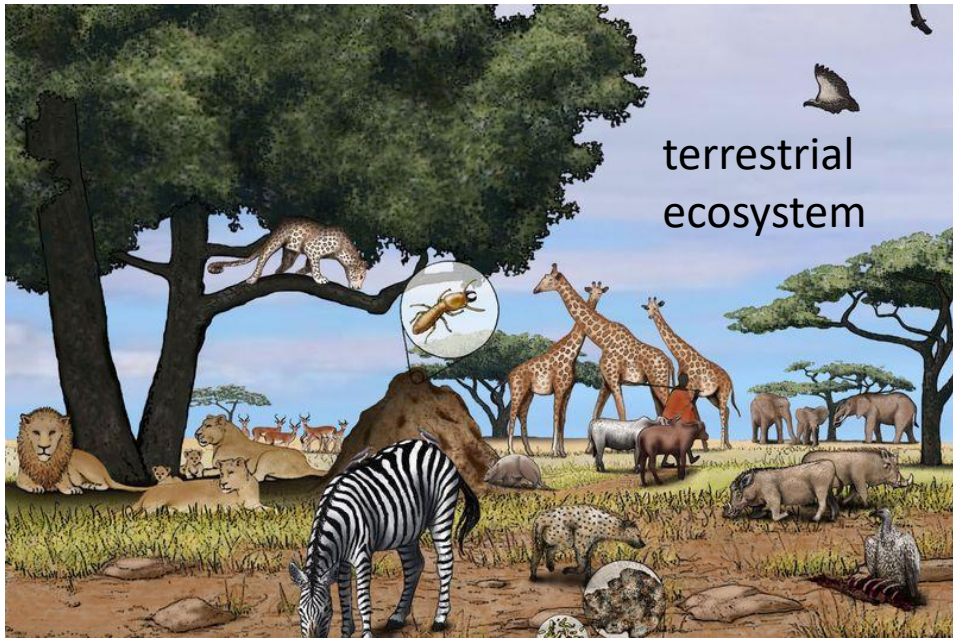

https://www.nationalgeographic.org/topics/resource-library-terrestrial-ecosystem/?q=&page=1&per_page=25

Organisms in Ecosystems

- Even though two species occupy the same habitat, they do not occupy the same niche because resources (food, shelter) are used in different ways
- It is an advantage for a species to occupy a different niche, unique strategies are important to reduce competition