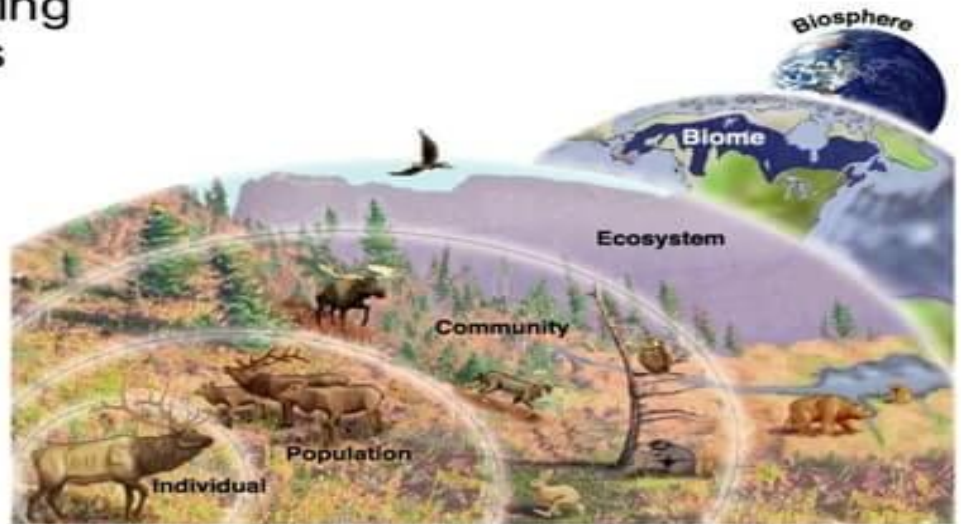


Levels of Organization

Ecologists study organisms ranging from the various levels of organization:

- **Species**
- **Population**
- **Community**
- **Ecosystem**
- **Biome**
- **Biosphere**



Individual / Organism

- Organism is an individual living being that has the ability to act or function independently.
- An organism is the simplest level of organization in ecology. Essentially, *an organism is an individual*.
- This level of the hierarchy examines how one organism interacts with its environment.
- Aspects of evolution are used extensively in studying this level.
- For example, **the individual-organism level allows a scientist to study why a giraffe has a very long neck**. He can infer that evolution has given the giraffe the long neck so it can reach a food source high on a tree. I.e:- **Why we are like this today.. evolution..?**
- Organismal ecology is concerned with the biological, morphological and physiological development of individual organisms in response to their natural environment.

Species

- Species are a **group** of living organisms consisting of **similar individuals capable of exchanging genes or are able to reproduce fertile offspring**.
- They are considered as the basic unit of taxonomy and are denoted by a Latin binomial, e.g. *Homo sapiens*.
- Many closely related organisms can mate and produce offspring, but if their offspring cannot then produce offspring of their own, then the parents are not the same species.
- **A mule**, which is the offspring of a **female horse** and a **male donkey**. Mules are sterile, meaning they can't produce offspring. So despite the fact that the horse and donkey successfully reproduced, their offspring can't reproduce. Therefore, the parents are different species!
- Tigers and lions can mate and produce a liger. But ligers can't make their own children.

Population

- Population is a **group of one particular species, occupying a defined area** during a specific time.
- Ex:- group of birds that live near your house, you know which one, is an example of a population.
- The three most **important characteristics** of a population are its **density, growth rate, and distribution**.
- Population growth rate can be positive due to birth and/or immigration or negative due to death and/or emigration.

Population Density

The *population density* is the **number of organisms in a very specific area**, like how many burrowing owls live in a square mile.

Population Growth

Population growth is the rate at which the population grows. The growth rate is **controlled by three things**: the number of **births**, the number of **deaths**, and the number of organisms leaving (**emigration**) or entering (**immigration**) the population. **If a population is in an excellent environment, it may undergo exponential growth.**

Exponential growth happens when the members of a population increase at a constant rate and have few deaths. The plot of exponential growth looks like a J, it starts low but increases very quickly. Like humans.

Carrying Capacity

- No populations can have exponential growth forever.
- Although we humans have been pushing our luck with it for a while now.
- **There is a point where an ecosystem can not support any more members of a population, which is called its carrying capacity.**

When the carrying capacity is reached, the number of organisms will undergo logistic growth. **When the growth rate of a population begins to slow down or stops after exponential growth, it is called *logistic growth*.** This can happen for any number of **reasons, such as food scarcity or disease.**

Limiting Factors

The **factor that causes a population to begin to decrease** is called a limiting factor. Limiting factors come **in two types: density-dependent** and **density-independent**.

Density-dependent limiting factors are things like **competition for resources, predation, parasitism, and disease**. Competition happens when a population becomes too large and must compete for food, water, shelter, and other resources.

Density-independent factors include things like **natural disasters, odd weather, and clear-cutting forests**.

Community

- It refers to the several **interacting different populations** that **inhabit a common environment and are interdependent**.
- These interactions can be positive, negative or neutral (have no effect) and can greatly impact the ecosystem the organisms live in.
- Communities in most instances are named after the dominant plant form.
- For example, a grassland community is dominated by grasses, though it may contain herbs, trees, etc.

Major Communities

- These are large sized and relatively independent.
- They depend only on the sun's energy from outside. E.g. **Tropical evergreen forests**.

Minor Communities

- These are dependent on neighbouring communities and are often called **societies**.
- They are secondary aggregations within a major community. E.g. A mat of lichen on a cow dung pad.
- Community ecology **studies the interactions of the different species in an ecosystem. The community in a pond could include fish, frogs, algae, plants, and snakes.**
- Community ecology can study **interactions like predation and competition, or symbiotic interactions like mutualism, commensalism and parasitism.**