Ecology: is the scientific study of interaction between organisms and their environment. It includes both biotic and abiotic factors.

The term of ecology (Oekologie) was coined in 1869 by the German biologist Ernst Haeckel from the Greek word (Oikos) meaning house or dwelling, and (logos) meaning study or discourse. Thus ecology is the study of relationship of organism with their houses or more broadly the environment.

Environment

The term environment describes the sum total of physical, chemical and biotic conditions surrounding and influencing the living organisms. Environment is classified into 3 types:

1-Biotic (Biological) Biotic elements refer to the biological component of the ecosystem, having the population of plants, animals and microorganisms. The biotic component of the ecosystem consists of 3 groups of organism, the producers, consumers and decomposers. The producers are the organisms those are capable for photosynthesis (plants). The consumers depend on the producers (all herbivores). The decomposers are the organisms that are rely on dead organisms for their existence (bacteria, virus, and yeast).

2-Abiotic (Physical) It includes the flow of energy necessary to maintain any organism, the physical factor (climate, temperature, rain, snow, hills) that affects it and the supply of molecules required for its life functions (carbon, hydrogen, nitrogen, sulphur, phosphorus).

3-Cultural The interaction between human and environment also influence the ecosystem. Background of different cultures put different values on natural world.

Importance of studying ecology

Environmental Conversation: By studying ecology, the emphasis is put on how every organism needs other for peaceful coexistence. Having no ideas on ecology

will responsible for degradation of land and environment, which is the living place of other species leading to their destruction.

Resource Allocation: All plants and animals have roles in the environment as they sharing limited natural resources such as air, minerals, space. Lack of ecological studies may be the cause of deprivation and looting of these natural resources.

Energy Conservation: The entire living organism needs energy such as nutrition, light, radiation etc. So lack of ecological studies will be the cause for destruction of the energy resources. Oil, coal, and natural gases are the non-renewable sources which will destruct the ozone layer.

Eco-friendliness: It helps to appreciate living among the organisms; this will follow natural order of things.

Types of ecology

The ecological studies are all about connections of all life forms in earth and their various types of ecology (Figure 1).

Individual (Organism Ecology): This is the study of organism respond to stimuli caused by physical environment. The organisms adapt the environment either happily or ignoring away from its effect. A physical change in environment will show the change in behaviour or physical attributes. **Organism-** any unicellular or multicellular form exhibiting all of the characteristics of life; an individual

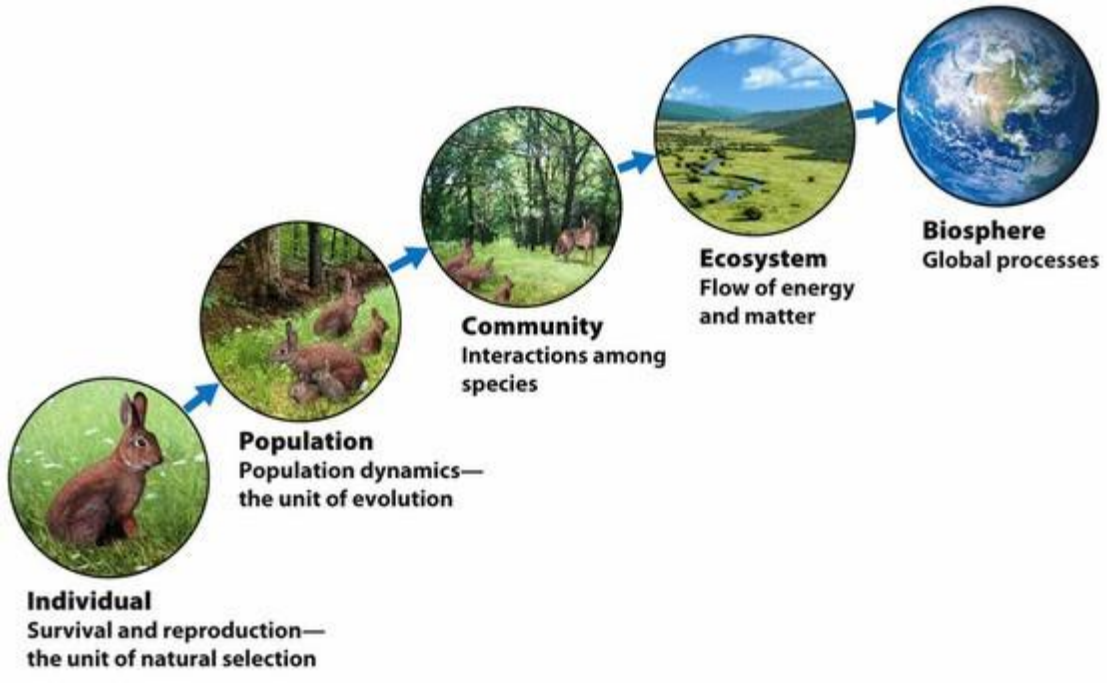
Population Ecology: population is a group of organisms of the same species that live in the same area. Or Population-a group of organisms of one species living in the same place at the same time that interbreed and compete with each other for resources (ex. food, mates, shelter)

Community Ecology: The association of populations of two or more different species occupying the same geographical area. Competition, mutualisms are key interactions to maintaining a community.

Ecosystem Ecology: This is the community of living organisms along with non-living environment like air, water, soil. populations in a community and the abiotic factors with which they interact

Biome Ecology: group of ecosystems that have the same climate and dominant communities. A biome is a group of similar ecosystems with the same general abiotic factors and primary producers. Biomes may be terrestrial or aquatic.

Biosphere: consists of all organisms on Earth, or biosphere is the biological component of earth. The biosphere is the global sum of all ecosystems; integrating all living beings and their relationships, including their interactions with the elements of the lithosphere, hydrosphere, and atmosphere.



Habitat and Niche

Habitat- the place in which an organism lives out its life (address)

Niche - the role a species plays in a community (job)

A niche is determined by the tolerance limitations of an organism, or limiting factors.

Limiting factor- any biotic or abiotic factor that restricts the existence of organisms in a specific environment.

Examples of limiting factors

Amount of water
Amount of food
Temperature

The Habitat Physical environment to which an organism has become adapted and survives in.

A habitat is the place where an organism lives while a niche is that organism's role within that environment. Habitat focuses on how the environment impacts the organism while nich focuses on how the organism impacts the environment. Both habitat and niche are important concepts to understanding the balance of an ecosystem and the biodiversity found there.

Types of Habitat

1. **Terrestrial Habitats:** Habitats on land are called terrestrial habitats. Terrestrial habitats are followed by:

(a) **Grassland:** Grassland habitats are dominated by grass, small trees and shrubs. They get moderate rain, usually windy and dry.

(b) **Mountains:** Mountains are habitats found at higher altitudes where the climate is extremely cold and windy.

(c) **Forests:** Forest habitats are divided into three sub-division. They are Tropical forest, Temperate forest and Boreal forest. They are dominated by the presence of a large number of plants and trees.

(d) **Deserts:** Deserts are sandy lands that receive very little rainfall, and the regions are hot and dry.

(e) **Polar regions:** Polar regions are totally covered with snow and can experience very cold temperatures.

2. **Aquatic Habitat:** Habitat in water is called aquatic habitat. It is further classified into two habitats:

(a) **Freshwater Habitat:** Freshwater habitat includes rivers, streams, ponds and lakes.

(b) **Marine Habitat:** The saltwater habitat is called marine habitat. Planktons, seaweeds, fish, whales, crabs, octopuses, turtles, starfish, etc., are present in this habitat.

What are the 4 Types of Niches?

1. **Habitat/Spatial Niche:** It illustrates the microhabitat occupied by various species in a general habitat.
2. **Trophic Niche:** It is accountable for the useful role of a specific species and how the species position is in comparison to others.
3. **Multidimensional Niche:** It benefits understanding the position of a particular species in the tip and rise of the environment.
4. **Fundamental Niche and Realized Niche:** Hutchinson recognized two types of niches; fundamental niche and realized niche. The fundamental niche of a species is the hypervolume that a population can fill in the absence of competitors. So each species has a fundamental niche within a community. However, because of competition, due to similar essential along the niche dimension, the competitor niches will be overlying one another. As a result of these biotic constraints, only a part of the niche is realized by the species. These smaller hyper volumes occupied by a species are termed the realized niche.

Difference between Habitat and Niche

The table below shows the main difference between habitat and niche

Habitat	Niche
A habitat is a particular place where organisms live, i.e. address	A niche defines a particular role played by organisms in an ecosystem, i.e. profession
Habitat is not species-specific and many species can occupy the same habitat	Niche is species-specific and it supports only a single species
Habitat consists of several niches	Niche is specific to a particular species, which may overlap with a similar niche but must have distinct differences
Habitat is a superset of niche	Niche is a subset of habitat
Examples: desert, ocean, mountains, grassland, forest, etc.	Examples: different trophic position occupied by Darwin's finches