

# Insect Ecology

## Lecture: 1

### Introduction To Ecology

Ecology: The term ecology is derived from the Greek term "oikos" meaning "house" combined with "logy" meaning "the science of" or "the study of" = science of house or the study of house.

#### Some definitions of Ecology.

The original definition is from Ernst Haeckel, 1869, who defined ecology as the study of the relationship of organisms with their environment.

- 1- Ecology is the science of interrelation between the living organisms and their environment, including both the physical and the biotic factors.
- 2- Ecology (Environmental Science): The study of the distribution and abundance of organisms.

**Insect Ecology:** Is the branch of entomology that focuses on the interrelationships between insects & their environment.

- a- **Autecology:** The study of an individual organism or a single species
- b- **Synecology:** The study of groups of organisms.

Ecology is the multi-disciplinary subject, and derives support from such sciences as animal biology, taxonomy, physiology, animal behavior, meteorology, geology, physics, chemistry and even sociology.

**The branches of ecology are :** لقهكائى نيكولوژيا

- 1- Physiological ecology.
- 2- Behavioral ecology.
- 3- Community ecology.
- 4- Ecosystem ecology.
- 5- Applied ecology .
- 6- Theoretical ecology etc.

## Foundations of Ecology: بنہ ماکانی نیکولوژی

- Genetics = "currency" of life
- Evolution = process by which the existing life originated
- Behavior (Ethology) = the response of organisms to stimuli.
- Physiology = study of the functions and activities of life – and the physical and chemical phenomena involved.

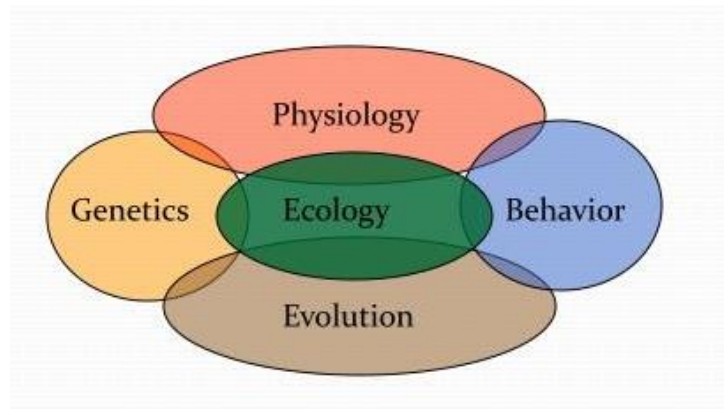


Fig. (1) Foundations of ecology

### Environment

Environment can be defined as a sum total of all the living and non-living elements and their effects that influence organisms life. While all living or biotic elements are animals, plants, forests, fisheries, and birds, non-living or abiotic elements include water, land, sunlight, rocks, and air.

**The environment** refers to the surroundings of an organism or species or sum of everything that affects the organism, and is generally considered to consist of two categories of factors: Abiotic (*Density independent factors*) & Biotic factors (*Density dependant factors*).

**Abiotic factors** refer to nonliving aspects of the environment that affect an organism, such as temperature, moisture and humidity, rainfall, light, atmospheric pressure, air currents, water, oxygen, pH, salinity, place to live

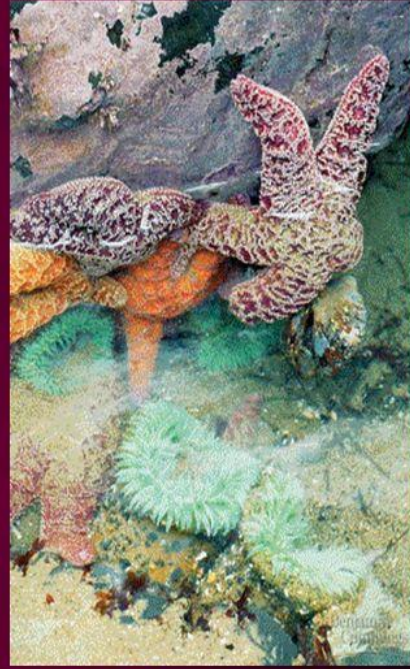
**Biotic factors** refer to other organisms that interact with an organism or species, or the organic products of those organisms. Examples of biotic factors include: the species that produce the food (*primary producers*) eaten by an organism, species that feed on and harm the organism (*consumers*), including: *predators*: species that kill and eat their prey and have no long term interaction with them, *parasites*: species that live on or in their host over a long period of time and harm, but are unlikely to directly kill, the host, *parasitoids*: species whose eggs are laid on the host (typically on the larval stages of insect hosts) and which then develop.

### **Ecosystems:**

What is an ecosystem? **An ecosystem is a community of living and non-living things that work together – it consists of abiotic (soil, water, air) and biotic parts (flora, fauna).** Ecosystems have no particular size. An ecosystem can be as large as a desert or as small as a tree. The major parts of an ecosystem are: water, temperature, plants, animals, air, light and soil. They all work together. If there isn't enough light or water or if the soil doesn't have the right nutrients, the plants will die. If the plants die, animals that depend on them will die. If the animals that depend on the plants die, any animals that depend on those animals will die. All the parts in an ecosystem work together to achieve balance. A healthy ecosystem has **lots of species** and is less likely to be damaged by human interaction, natural disasters and climate changes. Every species has a **niche** in its ecosystem that helps keep the system health.

# Ecosystem

- Groups of many species coexisting in an environment.



# Biosphere

- All of the earth's organisms and their environments.



**Distribution** refers to where organisms are found.

**Abundance** refers to how many organisms occur, If a species occur in *many habitats*, it will appear abundant on a large scale -we will encounter it in many places. We can also look at abundance in terms of **numbers of species**, rather than in terms of individuals of a single species.

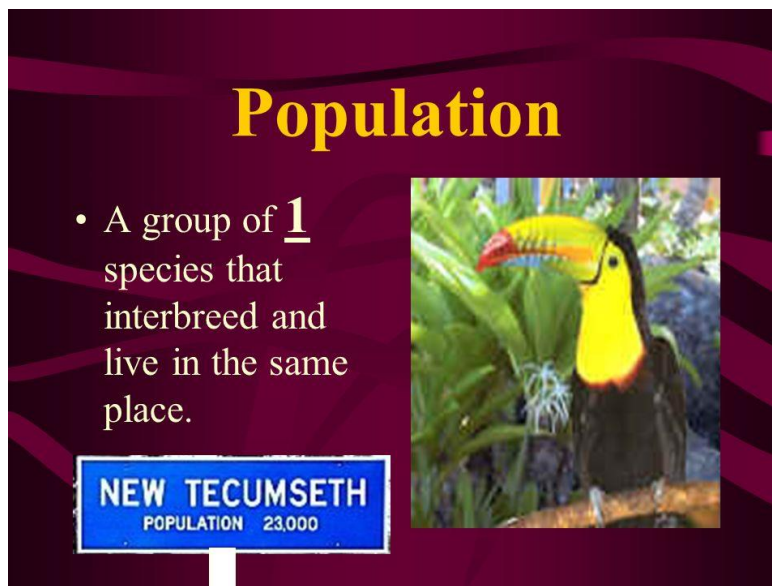
**Interactions**: Refer to the relationships between an organism or species and aspects of its environment.

The above explanations of distribution, abundance, and interactions should indicate that we can study ecology on a various different levels.

## The main levels studied by ecologists are:

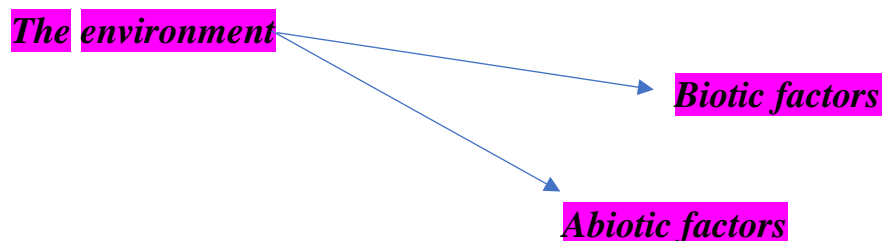
**Individuals:** We can consider how individuals are affected by the environment; this can determine whether they can survive (which will affect their distribution) and how well they reproduce (which will affect their abundance).

**Populations:** A population is a group of organisms of the same species in a certain area at the same time. We can look at the factors that determine how large a population grows, that regulate it at a certain size, or that cause population size to fluctuate.



**Communities:** A community usually refers to all the organisms within an area. We can also talk about a community of some type of organism, such as the community of Aphids on *Citrus* trees in California.

**Habitat** is the place where the organisms live.



## Environment vs Ecosystem

Following are the important difference between environment and ecosystem:

Environment	Ecosystem
It is the surrounding where organisms live.	It is the community where the biotic and abiotic components interact with each other.
It comprises physical components.	It comprises biological components.
It provides a living space for the elements	It provides interaction between the elements
It provides the condition to live.	It provides the relation between components to live.
Environment can be macro or micro.	Ecosystem can be aquatic or terrestrial.
An organism's environment changes as it moves from one place to another.	The ecosystem remains the same no matter where the organism travels.
Environment is just a place in time.	Ecosystem depends upon all the essential life processes such as photosynthesis.

### References

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