

# EDGE IAS



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## Environment and Ecology

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# 1. Ecology and Ecological Principle

## 1.1 Environment

Environment: derived from French word “Environer/Environner” meaning “neighborhood” / “surrounding”.

“All the biological and non-biological entities surrounding us”.

According to the Environment Protection Act (EPA), 1986 , it is defined as - “Environment includes all the physical and biological surrounding of an organism along with their interactions.”

Thus environment is the sum total of water, air and land; and inter – relationship that exist among them; and with the human beings, other living organism and materials.

The environment broadly includes living and non-living components which are listed in the table given below.

Abiotic	Biotic
Light, climate(humidity and temperature), atmospheric gases, water, substrata (soil, river/sea bed).	Living organisms including plants, animals, microorganisms (bacteria, fungi, protozoa), and human beings.

**Table 1.1: Components of environment**

## 1.2 Ecology

Ecology : derived from two Greek words, “Oikos means house/home” and “Logos means study of”

Ernst Haeckel (German biologist) in 1869 coined this term. Ecology is the scientific study of the relationship of the living organism with each other and with their environment.

## 1.3 Levels of Ecological Organization

Ecology not only deals with the study of the relationship of individual organisms with their environment, but also with the study of populations, communities, ecosystems , biomes and biosphere as a whole (See Fig. 1.1).

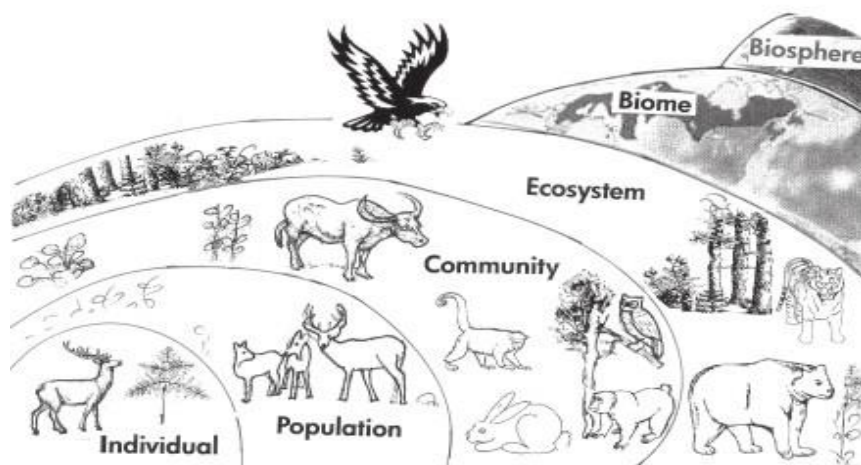


Figure 1.1: Levels of ecological organization and types of ecological study

### 1.3.1 Organism/Individual

Organism is an individual living being that has ability to act or function individually/independently. Organisms are basic unit of study in ecology. At the level of the organism we intend to understand or study of the form, physiology, behavior, distribution and adaptation of organism in relation to environment.

Species – A group of similar organism having the potential for inter breeding and producing fertile offsprings is called a species.

### 1.3.2 Population

Population is a group of individuals (organisms) usually of similar species, inhabiting in a given area and interacting with each other for e.g. all individuals of elephant in an area constitute its population. We study of interaction between populations and intraspecific relationships.

### 1.3.3 Community

Biological community is an assemblage of population of plants, animals, bacteria or fungi that live in an area and interact with each other. A biological community has distinct species, compositions and structure.

The characteristics pattern of the community is termed as structure of the community and determined by,

- The roles played by its various populations;
- The range of its various populations;
- The type of area that is inhabited by the populations of the community;
- The diversity of species in the community;
- The interactions between various populations of the community inhabiting the area. Communities in most instances are named after the dominant plant form (species) for e.g. Grassland community dominated by grasses though it may contain herbs, shrubs, trees along with associated animals of different species.

Members of a community also actively interact with their environment. A community is not fixed or rigid. Communities may be large or small. In a community only those plants and animals survive which are adapted to a particular environment. The climate determines the type of environment, hence, the type of organisms in a community. For example, it is the climate of the area which determines whether a given area becomes a desert or a forest.

Communities created by human such as lawns or crop communities. Such man made communities are relatively simple and generally consists of only one species as opposed to a natural community characterized by a large number of species. Man-made communities are very unstable and require great deal of care and constant manipulation and maintenance.

Broadly speaking, there are two types of communities. These are major and minor community:

**(a) Major Community:** It is a large community which is self-regulating, self-sustaining and independent unit comprising of a number of minor communities in it. Examples of major communities are: a pond, a lake, a forest, a desert, a meadow and grassland. Each of these major communities includes several minor communities.



**(b) Minor Community:** It is a smaller community which is not a self-sustaining unit. It is dependent on other communities for its existence. The major community exemplified by a forest has many minor communities namely the plant community (the plant population of the forest), the animal community (the animal population of the forest) and the microbial community (bacteria and fungi population).

### 1.3.3.1 Characteristics of a Community:

A community has the following characteristics:

**(a) Structure:** Structure of a community can be studied by determining the density, frequency and abundance of species.

**(b) Dominance:** Usually a community has one or more species which occur in sufficient abundance (having high density). Such species are called dominants. These species dominate and influence other species in terms of number and biomass. Ecological community is often named after them. For e.g. grassland, fin forests.

**(c) Diversity:** The community consists of different groups of plants and animals of different species, may be large and small, may belong to one life form or another but are essentially growing in a uniform environment. Even in the same community there may be seasonal variation. Some communities such as rain forest and coral reef community show high species diversity with many different kinds of species living at each trophic level.

**(d) Periodicity:** This includes study of various life processes (respiration, growth, reproduction etc.) in the various seasons of the year in the dominant species of a community. The recurrence of these important life processes at regular intervals in a year and their manifestation in nature is termed periodicity.

**(e) Physiognomy and Stratification:** Physiognomy refers to the external appearance or look of the community. The external appearance is the total effect created by the combination of vertical structure and architecture of dominant species of vegetation. However, several communities may have similar physiological many yet they differ sharply on the basis of species compositions and dominance (for e.g. different forest types – coniferous and deciduous).

Stratification of a community depicts vertical layering of the vegetation.

Natural forest communities possess a number of layers or stores or strata related to the height of plants, for example, tall trees, smaller trees, shrubs and herbaceous layers form the different strata.

**(f) Eco-tone and Edge-effect:** A zone of transition between two different types of communities is called eco-tone. These are marginal zones and are easily recognizable.

Usually, in eco-tones, the variety of one species is larger than in any of the adjacent communities. A phenomenon of increased variety and intensity of plants at the common junction is called edge-effect and is essentially due to wider range of suitable environmental conditions.

The organism which occur primarily or most abundantly or spent the greatest amount of their time in junction between communities are called edge species.

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