

Environmental Studies

Semester-2

Ecology

Unit 2 Ecology and Ecosystems

- Concept of ecology and ecosystem, Structure and function of ecosystem; Energy flow in an ecosystem; food chains, food webs; Basic concept of population and community ecology; ecological succession.

- Characteristic features of the following:

- (a) Forest ecosystem

- (b) Grassland ecosystem

- (c) Desert ecosystem

- (d) Aquatic ecosystems (ponds, streams, lakes, wetlands, rivers, oceans, estuaries).

Some Definitions

An organism is a single, living thing and can be an animal, a plant, or a fungus. Organisms grow and respond to their environment.

A population is the term we use to describe multiple individuals or organisms of a single species that live within a particular geographic area.

A community is the term used to describe two or more populations of different species that occupy the same space at the same time.

An ecosystem is the term used to describe both the biotic (living) and abiotic (nonliving) factors in a system.

Organism - any unicellular or multicellular form exhibiting all of the characteristics of life, an individual.

- The lowest level of organization

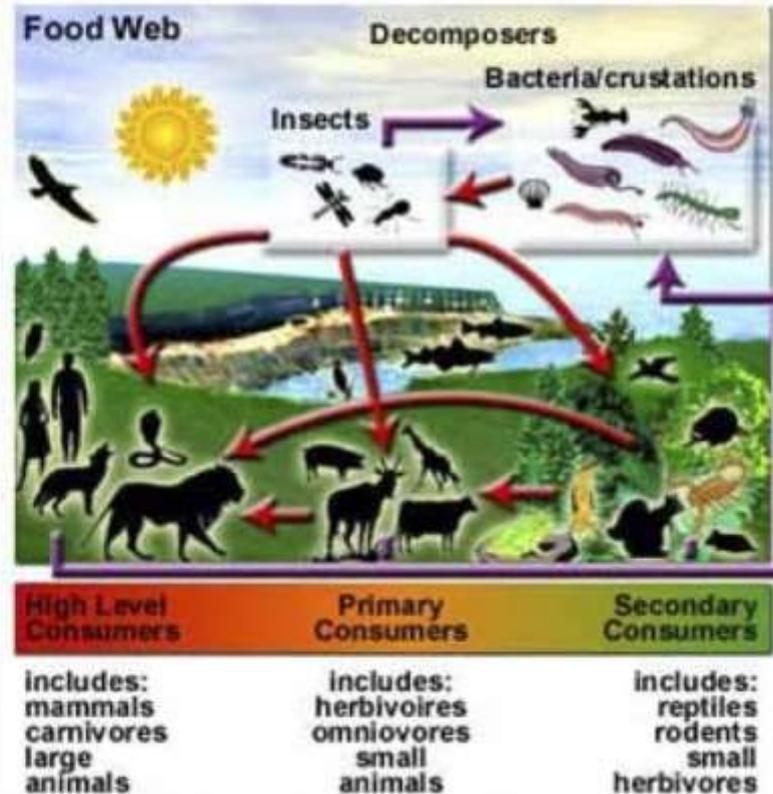


POPULATION

- ✓ A group of organisms of one species living in the same place at the same time that interbreed
- ✓ Produce fertile offspring
- ✓ Compete with each other for resources (food, mates, shelter, etc.)



Community - several interacting populations that inhabit a common environment and are interdependent.



Ecosystem - populations in a community and the abiotic factors with which they interact (ex. marine, terrestrial)



Biosphere - life supporting portions of Earth composed of air, land, fresh water, and salt water.

• The highest level of organization





Individual



Population



Community



Ecosystem



Biome



Biosphere

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graph TD; A([Biosphere]) --> B([Ecosystem]); B --> C([Community]); C --> D([Population]); D --> E([Organism]);
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Biosphere

Ecosystem

Community

Population

Organism

What is ecology?

Ecology- the scientific study of interactions between organisms and their environments, focusing on energy transfer

- It is a science of relationships.

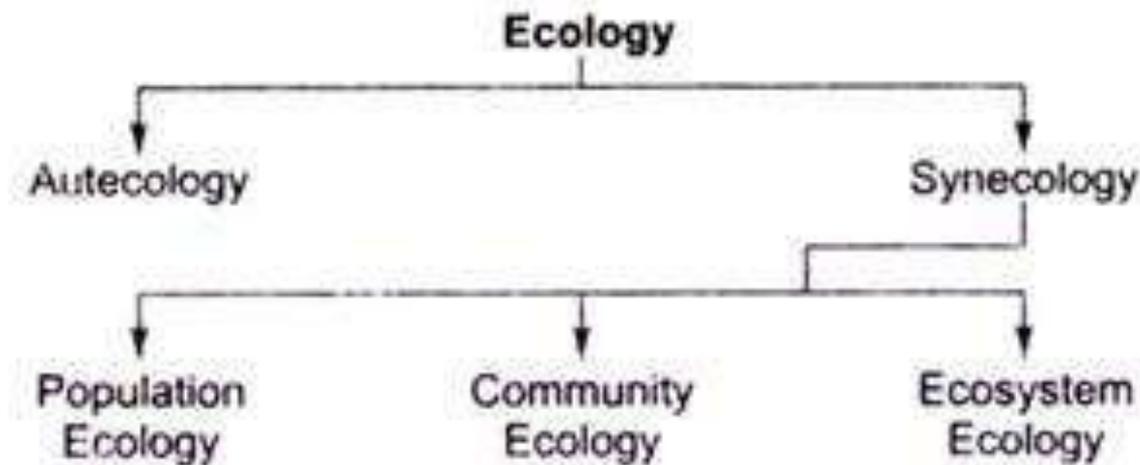
Ecology: the scientific study of interactions between different organisms and between organisms and their environment or surroundings



Ecology has been sub-divided into different fields so as to understand the subject in a more profitable way. Ecology can be commonly divided into animal ecology and plant ecology.

However, two major subdivisions were preferred by ecologists.

The whole subject was divided into autecology and synecology.





Autecology

A study of the individual species in relation to their environment is known as autecology.

It includes the study of its geographical distribution, taxonomic position, morphological characters, reproduction, life cycle and behaviour with reference to ecological factors that might influence these activities.



Synecology

A study of the groups of organisms in relation to their environment is called synecology.

Here the unit of study are the groups of species. It comprises population ecology, community ecology and study of the ecosystems.

Difference between Autecology and Synecology

Autecology	Synecology
It is the study of individual organism or individual species or a population in relation to their environment	It is the study of group of organisms or many species or communities in relation to their environment
It is also called as population ecology	It is also called as community ecology
The study is at the level of an individual, a population or an entire species	Synecology is concerned with study of the highest level of biological organization; many populations in an area (called as community) interacting with each other and also with the environment. It can even be the study of an
Autecology is comparatively simple experimental and inductive.	Synecology is complex, philosophical and deductive. (Refer: Inductive vs Deductive)
Autecology studies can be accommodated in a laboratory setup and data is interpreted using conventional mathematical tools**	Synecology studies refers to the interaction of a whole system and that cannot be accommodated in a laboratory setup as the system is naturally formed after interactions of hundreds of years such as a forest ecosystem
Example: Study of Zebra population in relation to its environment (may be factors like rainfall, hunting, lion population etc in a grassland ecosystem) see the figure (in dotted black lines)	Example: Study of entire grassland ecosystem (including all the species or communities) see the figure (in green thick border)