

Ecology: Definition, Scope and Relationship with other sciences

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- ❖ The word "ecology" ("oekologie") (coined by German scientist Ernst Haeckel, 1866) was derived from the Greek "*oikos*" meaning "household" and *logos* meaning "science:" the "study of the household of nature."
- ❖ Ecology is not synonymous with environment, environmentalism, or environmental science.
- ❖ Ecology is closely related to physiology, evolutionary biology, genetics and ethology.

An understanding of how biodiversity affects ecological function is an important focus area in ecological studies.

- ❖ **Ecology:** branch of [science](#) that deals with interaction between living organisms with each other and their surroundings.
- ❖ Ecological systems are studied at several different levels from individuals and [populations](#) to [ecosystems](#) and [biosphere](#) level.
- ❖ **Ecology is a multi-disciplinary science, drawing on many other branches of science.**
- ❖ [Applied ecology](#) is the practice of employing ecological principles and understanding to solve real world problems. E.g. calculating fish population, measuring environmental impact from construction or logging, building a case for the conservation of a species, and determining the most effective way to protect a species.
- ❖ In a broader sense, **ecology** can also mean:
 - ❖ [Natural environment](#): using the principles and methods of ecology.
 - ❖ [Human Ecology](#): looks at humans and their interactions with the natural environment.

Scope of Ecology

Ecology can be studied at several levels, from [proteins](#) and [nucleic acids](#) (in [biochemistry](#) and [molecular biology](#)), [cells](#) (in [cellular biology](#)), organisms (in [botany](#), [zoology](#), and other similar disciplines), and finally at the level of populations, communities, and [ecosystems](#) — which are the subjects of ecology.

Because of its focus on the broadest level of life and on the interrelations between living beings and their [environment](#), ecology draws heavily on other branches of science, such as [geology](#) and [geography](#), [meteorology](#), [pedology](#), [chemistry](#), and [physics](#).

The behavioral relationship between individuals of a [species](#) —

e.g. The study of the [queen bee](#), and how it relates to the worker [bees](#) and the [drones](#).

The organized activity of a species e.g. the activity of the bee assures the [pollination](#) of [flowering plants](#).

A bee hive additionally produces [honey](#) which is consumed by other species, such as [bears](#) &

The consequences of the environmental change on the bee activity. Bees may die out due to environmental changes (see [pollinat or decline](#)). The environment at the same time both affects and is a consequence of this activity and is thus intertwined with the survival of the species.

Disciplines of ecology

Ecology is a broad science which can be subdivided into major and minor sub-discipline. The major sub-disciplines include:

[Behavioral ecology](#), studies the ecological and evolutionary basis for animal behavior, and the roles of behavior in enabling animals to adapt to their ecological niches;

[Population ecology](#) (or [autecology](#)), deals with the dynamics of populations within species, and the interactions of these populations with environmental factors;

[Community ecology](#) (or [synecology](#)), studies the interactions between species within an ecological community;

[Landscape ecology](#), studies the interactions between discrete elements of a [landscape](#);

[Ecosystem ecology](#), studies the flows of energy and matter through [ecosystems](#);

[Global ecology](#), looks at ecological questions at the global level, often asking [macroecological](#) questions.

Ecology can also be sub-divided on the basis of target groups:

Animal ecology, Plant ecology, Insect ecology;

or from the perspective of the studied [biomes](#):

Arctic ecology (or polar ecology), Tropical ecology, Desert ecology

Other specialized branches of ecology include:

- [Chemical ecology](#), deals with the ecological role of biological chemicals used in a wide range of areas including defense against predators and attraction of mates;
- Systems ecology and [biogeochemistry](#) which focus on the flow of energy and nutrients within and among ecological units;
- [Ecophysiology](#), studies the relations between a single type of [organism](#) and the factors of its environment;
- [Ecotoxicology](#), looks at the ecological role of toxic chemicals (often [pollutants](#), but also naturally occurring compounds);
- [Evolutionary ecology or Ecoevolution](#) which looks at evolutionary changes in the context of the populations and communities in which the organisms exist;
- [Molecular ecology](#), attempts to address ecological questions at the molecular level, usually through by looking at [DNA](#) or allozymes;
- [Paleoecology](#): to understand the relationships between species in fossil assemblages, and in so doing gain insight into the way these species might have been shaped by their interactions with other species;
- Ecology also plays important roles in many inter-disciplinary fields: ecological design and ecological engineering, [ecological economics](#).
- [Human ecology](#) and ecological anthropology [social ecology](#), [ecological health](#) and environmental psychology.

Finally, ecology has also inspired other non-biological disciplines such as [industrial ecology](#), software ecology and [information ecology](#).

Thus, Ecology is often said to be a [holistic](#) science.

Broadly, ecology is divided into following categories:

Physiological ecology, having to do with the response of single species to environmental conditions such as [temperature](#) or light;

[Population ecology](#), usually focusing on the abundance and distribution of individual species and the factors that cause such distribution;

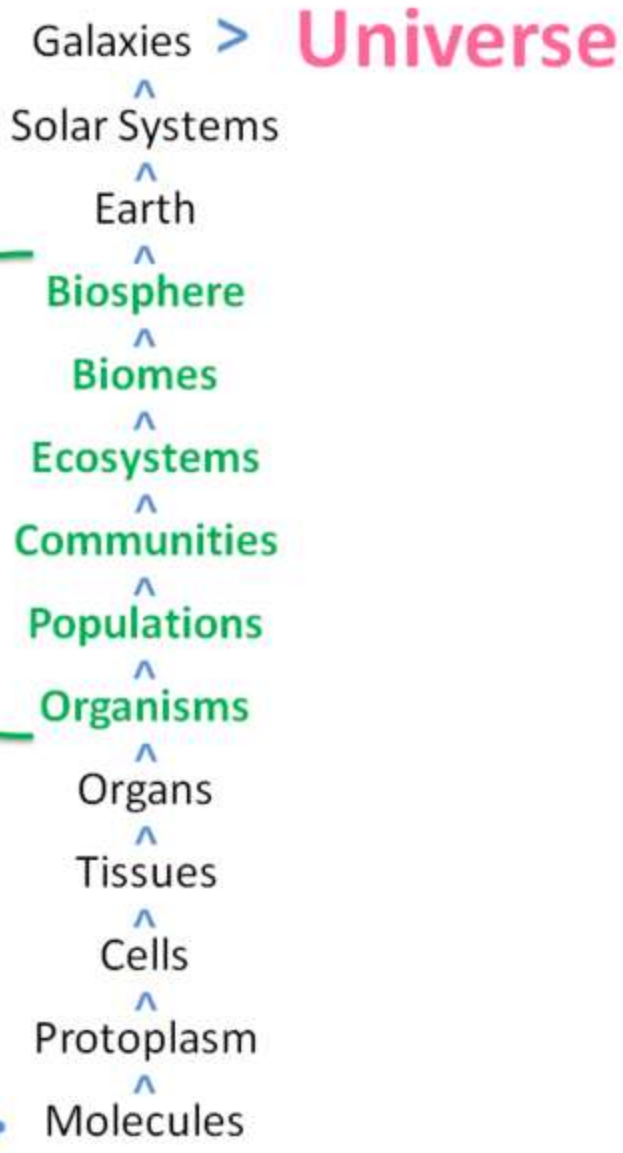
[Community ecology](#), having to do with the number of species found at given location and their interactions; and

[Ecosystems ecology](#), having to do with the structure and function of the entire suite of microbes, plants, and animals, and their abiotic environment, and how the parts interact to generate the whole. This branch of ecology often focuses on the [energy](#) and nutrient flows of [ecosystems](#), and when this approach is combined with computer analysis and simulation we often call it systems ecology.

Evolutionary ecology, which may operate at any of these levels but most commonly at the physiological or population level, is a rich and dynamic area of ecology focusing on attempting to understand how [natural selection](#) developed the structure and function of the organisms and ecosystems at any of these levels.

Levels of Organization

Ecology



Importance of Ecology

1. Since all of us live in a natural or partly natural [ecosystem](#), then considerable pleasure can be derived by studying the environment around us.
2. Human economies are based on the exploitation and management of nature. Applied ecology is used every day in [forestry](#), [fisheries](#), range management, [agriculture](#), and so on to provide us with the food and fiber we need.
3. Human societies can often be understood very clearly from an ecological perspectives as we study, for example, the population dynamics (demography) of our own species, the food and fossil energy flowing through our society.
4. Humans appear to be changing aspects of the global environment in many ways. Thus, ecology can be very useful to help us understand what these changes are, what the implications might be for various ecosystems, and how we might intervene in either human economies or in nature to try to mitigate or otherwise alter these changes. There are many professional ecologists, who believe that these apparent changes from human activities have the potential to generate enormous harm to both natural ecosystems and human economies. Understanding, predicting and adapting to these issues could be the most important of all possible issue for humans to deal with. In this case ecology and environmentalism can be the same.