

Ch-1

Introduction to Ecology



- **Important branch of science, also called Environmental Biology.**
- **Youngest branch connected with organisms and their environment.**
- **ECOLOGY** word derived from Greek word *Oikos*= house, and *logos*= study

Ecology



- **Ecology—the scientific study of interactions between different organisms and between organisms and their environment or surroundings.**
- **Studies of inter-relationships of organisms with their physical and biotic environment can be called as Ecology.**

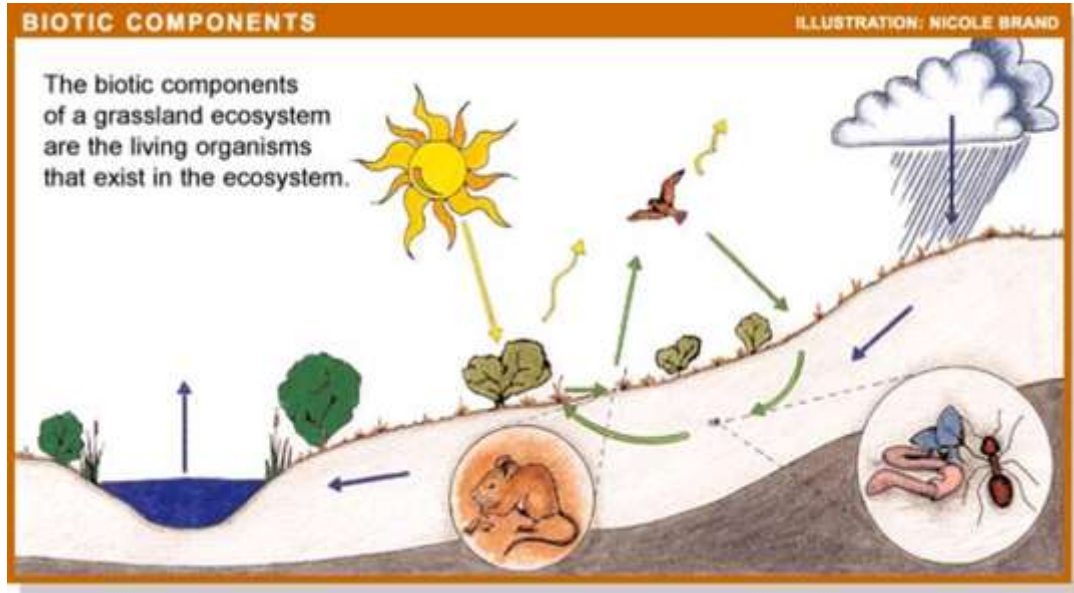


- **E.P. Odum (1963)- ecology as structure and function of nature.**
- **Ernst Haeckel (1866)- ecology as a branch of science deals with the total relationships of organisms to both their organic and inorganic environment.**
- **Ecology—the scientific study of interactions between different organisms and between organisms and their environment or surroundings**



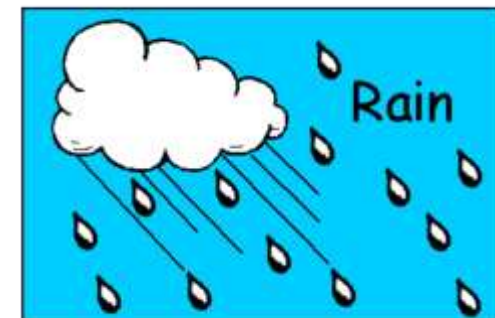
Structure, growth, reproduction, etc. of an organism are controlled by environmental factors like-soil, temperature, water, nutrients in soil, etc.

Interaction among them selves.

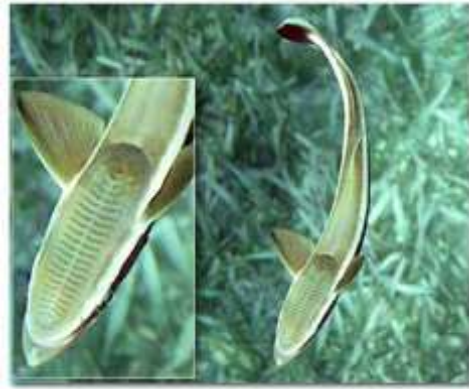


Biotic—living factors that influence an ecosystem

Abiotic—non-living factors that influence an ecosystem



- **Earlier separate study was carried out in plant ecology and animal ecology like biology.**
- **Modern researchers studied both as a whole.**



Ecology is divided in to

a. Autecology- study of individual species or it's population in relation to biotic & abiotic envt.

Study of organism or species throught out life, interaction among themselves and environment. E.g.: rat and it's species.



b. synecology- deals with structure, number, development, distribution and interactions of organic community of local with environment & among them selves as a whole.

Autecology is must for synecology.

Study of different plants and animals in forest and their relationship among themselves & with envt. Called synecology of forest.



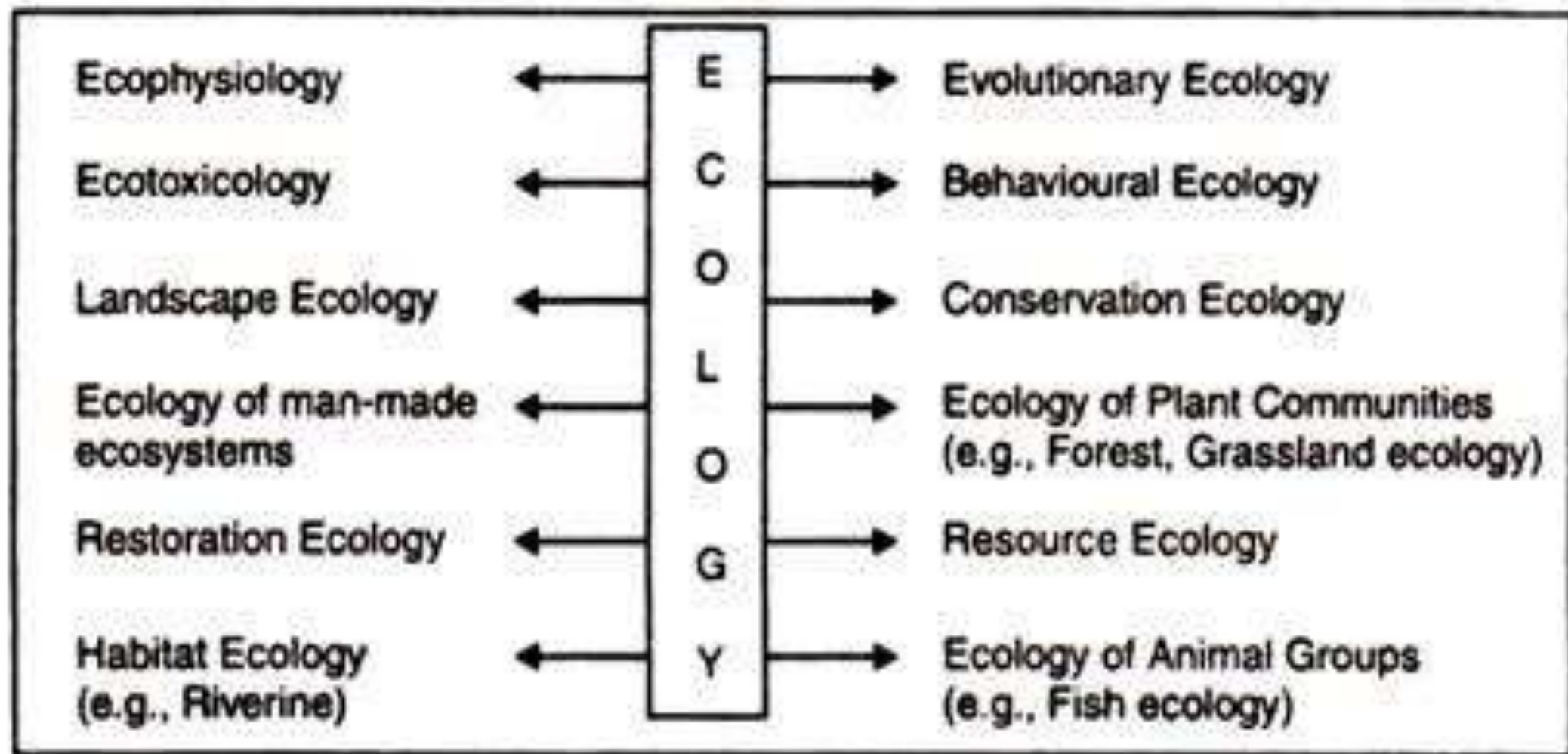


Fig. 1.2. Some important subfields of Ecology (All subfields are not mentioned).

Based on taxonomic positions, branches of ecology:

Habitat ecology: study of different habitat. (marine. Grassland, forest, etc.)

Population ecology/ demecology: population of different species with concern to birth rate, death rate, different factors affecting number, growth and size.



Conservation ecology: raw materials like, coal, water, oil, minerals, etc. required for human welfare are limited. Proper use and planning.

Production ecology: gross or net production of different ecosystems (marine, agriculture, horticulture, etc. to achieve maximum production)



Radiation ecology: study of effects of radiation and radioactive substance on organisms and environment. Helps in proper management, understand problems and possible solutions for same.

Paleoecology: fossil study for past animals and living beings



Gene ecology/ ecological genetics: study of genes and it's mutation, survival and extension of animal due to genes, mutation in genes for adaption.

Space ecology: modern and latest branch of ecology, trying to reach on other planets.



Taxonomic ecology: branch connected with different taxonomic groups and subdivided in to plant ecology, animal ecology, microbial ecology, vertebrate ecology, etc.

Human ecology: study of man and his environment.



Behavioural Ecology: concerned with explaining the patterns of behaviour in animals.

Physiological Ecology or Eco-Physiology: how organisms are adapted to respond to temperature, maintain proper water and salt balance, balance levels of oxygen and carbon dioxide, or deals with other factors of their physical environment.



Molecular Ecology: use of molecular biology to directly tackle ecological problems is the focus of molecular biology.

Evolutionary Ecology: emphasises the impact of evolution on current patterns and human induced changes. choose mates, determine the sex of their offspring, forage for food and live in groups, or how plants attract pollinators, disperse seeds, or allocate resources between growth and reproduction.



Restoration Ecology: It relates to the re-establishing of the integrity of natural systems that have been damaged by human activity.

Ecotoxicology: study of the fate and action of human-made substances, such as pesticides and detergents, in the natural world.



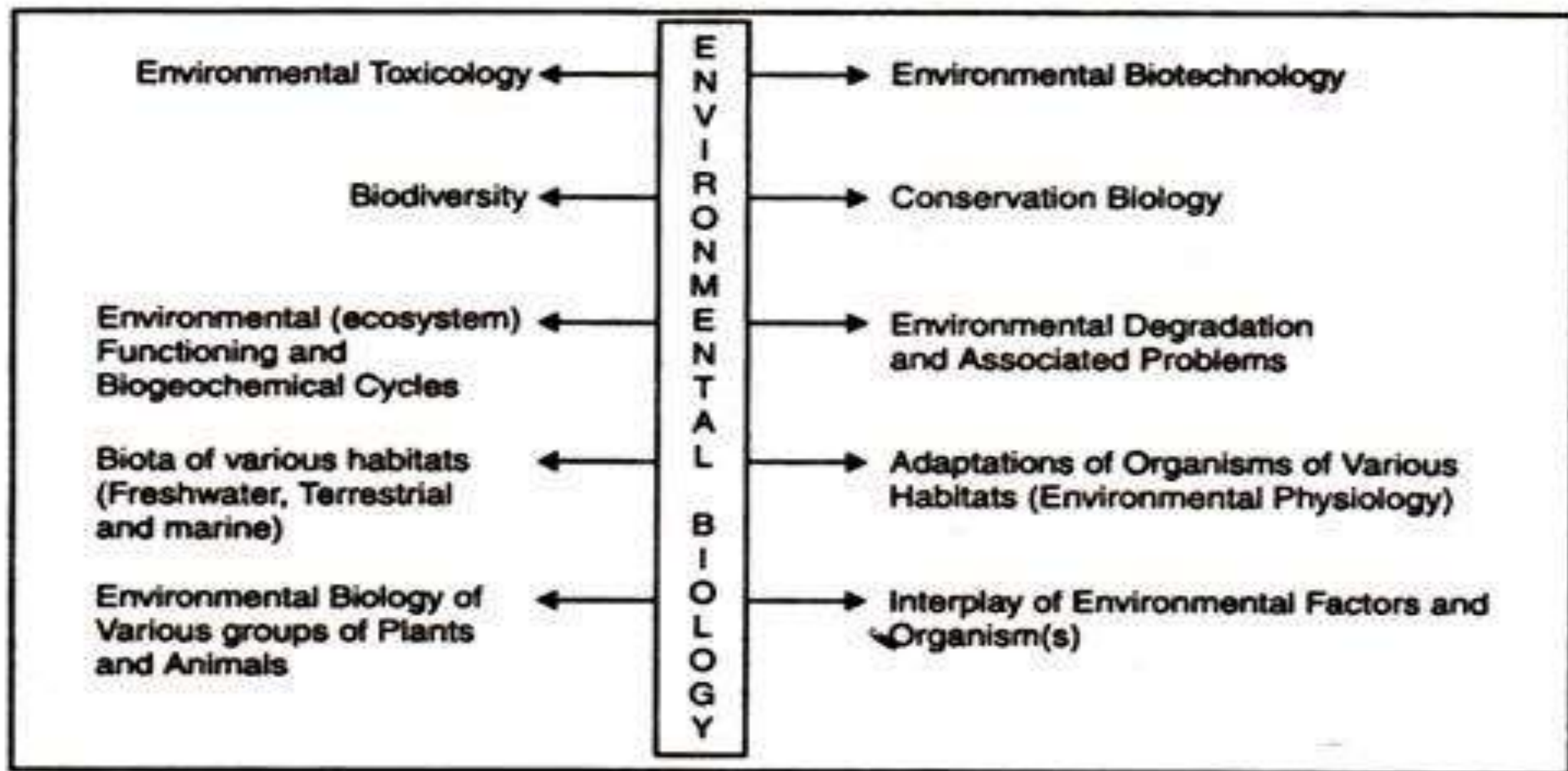


Fig. 1.3. Major study areas of Environmental Biology. All areas are not mentioned.

Scope and significance of ecology:

Taylor (1936), in an attempt to define ecology, has very rightly pointed out that scope of ecology by stating that ecology is the science of all the relations of ecosystems, all organisms to all their environments.

Complex branch of biology related to all most all branches of Science. Ecologist uses knowledge of Chemistry, Zoology, Botany, Physics, Microbiology, Cytology, Genetics, etc.

Ecosystem is defined as a dynamic entity composed of a biological community and its associated abiotic environment. Often the dynamic interactions that occur within an ecosystem are numerous and complex.



Ecosystems are also always undergoing alterations to their biotic and abiotic components. Some of these alterations begin first with a change in the state of one component of the ecosystem, which then cascades and sometimes amplifies into other components because of relationships.



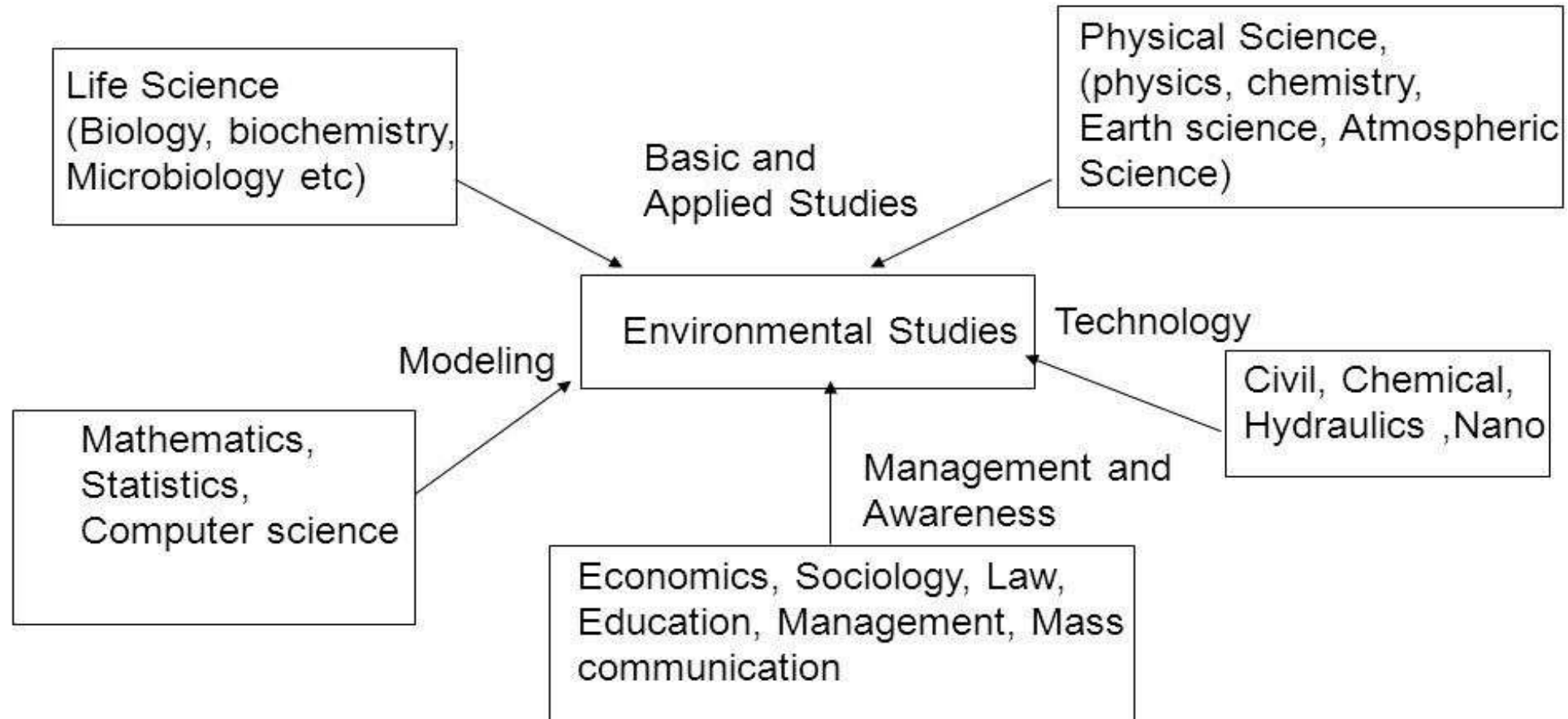
Environment:

The sum total of all surroundings of a living organism, including natural forces and other living things, which provide conditions for development and growth as well as of danger and damage. See also environmental factors

Read more:

<http://www.businessdictionary.com/definition/environment.html>

The multidisciplinary nature of environmental science is illustrated in following diagram



- **Biology & Environmental Studies**
- **Botany & Environmental Studies**
- **Zoology & Environmental Studies**
- **Physics & Environmental Studies**
- **Chemistry & Environmental Studies**

- **Mathematics, Geometry, Statistics & Environmental Studies**
- **Civics & Environmental Studies**
- **History & Environmental Studies**
- **Economics & Environmental Studies**
- **Politics & Environmental Studies**
- **Geography & Environmental Studies**

Community: includes all types of organisms in given area.

Attributes of community:

- **Community structure**
- **Ecological dominants and indicators**
- **Ecological stratification**
- **Ecotone and edge effect**
- **Ecological niches**
- **Ecological equivalents**
- **Ecological succession**

Producers

A. Sunlight is the main energy source for life on earth

Also called autotrophs

C. Use light or chemical energy to make food

- 1. Plants**
- 2. plant-like protists (algae)**
- 3. Bacteria**



Consumers

A. Organisms that rely on other organisms for their energy and food supply

B. Also called heterotrophs



Herbivores—obtain energy
by eating only plants

ETI • Insecten van Europa



Melitaea didyma

H. Bellmann



Carnivores—eat **only animals**

Omnivores—eat both plants and animals



Decomposers—breaks down dead organic matter

Ecology plays an important role in agriculture crop rotation, weed control, management of grasslands, range management forestry, biological surveys, pest control, fishery biology, and in the conservation of soil, wildlife, forest, water supplies, water bodies like rivers, lakes and ponds.

Reference:

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