INTRODUCTION TO ECOLOGY

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Introduction

Biology is the science of life. Ecology is basically a branch of biology. It deals with study of interactions among organisms and their biophysical environment. This biophysical environment includes both biotic and abiotic components. The word "ecology" ("Ökologie") was coined in 1866 by the German scientist Ernst Haeckel. It is derived from the Greek words Oikos- home + logos- study. The Biophysical environment in which all interactive mechanisms happen is called as an ecosystem. Since the ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life, earth science becomes the backbone of ecology.

Ecology deals with organisms, populations, communities, ecosystems and the biosphere. The place of living is the organism's environment. Hence, ecology is sometimes, called as environmental biology. In general, ecology is recognized as one of the natural sciences. It is considered to be a science concerned with the nature and the interrelations of living world. The term ecology has been derived from the Greek word "oikos" meaning 'habitation' or 'house' or 'living place'.

One of the first ecologists may have been Aristotle or perhaps his student, Theophrastus, both of whom had interest in many species of animals. Theophrastus described interrelationships between animals and between animals and their environment as early as the 4th century BC. Ecological thoughts are mostly derived from established concepts of philosophy, ethics , politics and natural history. Ancient Greek philosophers such as Hippocrates and Aristotle laid the foundations of ecology in their studies on natural history.

Modern ecology became a much more rigorous science in the late 19th century. Evolutionary concepts relating to adaptation and natural selection became the lead areas of study. In its early stages, the field was dominated by scientists trained as botanists and zoologists.

The Historical Development:

The following are the major milestones in the growth and development of the subject of Ecology.

1. The botanical geography and Alexander von Humboldt- "Idea for a Plant Geography" (1805).

2. In 1825, the French naturalist, **Adolphe Dureau de la Malle** used the term *societé* about an assemblage of plant individuals of different species.

3. The notion of biocoenosis: Wallace and Möbius

Alfred Russel Wallace, contemporary and competitor to Darwin, was first to propose a "geography" of animal species. Several authors recognized at the time that species were not independent of each other, and grouped them into plant species, animal species, and later into communities of living beings or biocoenosis. The first use of this term is attributed to **Karl Möbius** in 1877.

4. Warming and the foundation of ecology as a discipline

Eugen Warming devised a new discipline that took abiotic factors, that is drought, fire, salt, cold etc., as seriously as biotic factors in the assembly of biotic communities. Warming gave the first university course in ecological plant geography.

5. Darwinism and the science of ecology

The roots of scientific ecology may be traced back to Darwin. It comes from his work ***On the Origin of Species*** **which** is full of observations and proposed mechanisms that clearly fit within the boundaries of modern ecology. The term ecology was coined in 1866 by a strong proponent of Darwinism, **Ernst Haeckel**.

6. Early 20th century ~ Expansion of ecological thought

By the 19th century, ecology blossomed due to new discoveries in chemistry by **Lavoisier** and de **Saussure**, notably the nitrogen cycle. After observing the fact that life developed only within strict limits of each compartment that makes up the atmosphere, hydrosphere, and lithosphere, the Austrian geologist Eduard Suess proposed the term biosphere in 1875. Suess proposed the name biosphere for the conditions promoting life, such as those found on Earth, which includes flora, fauna, minerals, matter cycles, etc.

7. In the 1920s **Vladimir I. Vernadsky**, a Russian geologist, detailed the idea of the biosphere in his work **"The biosphere"** (1926). It was he who described the fundamental principles of the biogeochemical cycles. He thus redefined the biosphere as the sum of all ecosystems.

8. The Ecosystem: Arthur Tansley

Over the 19th century, botanical geography and zoogeography combined to form the basis of biogeography. This science, which deals with habitats of species, seeks to explain the reasons for the presence of certain species in a given location. It was in 1935 that **Arthur Tansley**, the British ecologist, coined the term ecosystem, the interactive system established between the biocoenosis (the group of living creatures), and their biotope, the environment in which they live. Ecology thus became the science of ecosystems.

9. Eugene Odum

Tansley's concept of the ecosystem was adopted by the energetic and influential biology educator Eugene Odum. Along with his brother, Howard Odum, Eugene P. Odum wrote a textbook which (starting in 1953) educated more than one generation of biologists and ecologists all over the world.

Eugene Odum, published his popular ecology textbook in 1953. He became the champion of the ecosystem concept. This ecosystem science dominated the International Biological Program of the 1960s and 1970s, bringing both money and prestige to ecology.

10. Ecological Succession - Henry Chandler Cowles

At the turn of the 20th century, **Henry Chandler Cowles** was one of the founders of the emerging study of **"dynamic ecology"**, through his study of ecological succession.

11. Ecology's influence in the social sciences and humanities

Human ecology has been a topic of interest for researchers, after 1920. Humans greatly modify the environment through the development of the habitat (in particular urban planning and growth), by intensive exploitation activities such as logging and fishing, and as side effects of agriculture, mining, and industry. Besides ecology and biology, this discipline involved many other natural and social sciences, such as anthropology and ethnology, economics, demography, architecture and urban planning, medicine and psychology, and allied areas. The development of human ecology led to the increasing role of ecological science in the design and management of cities.

12. Ecology and global policy

Ecology became the central part of the World's politics as early as 1971. It is mainly due to role of UNESCO which launched a research program called ***Man and Biosphere***, with the objective of increasing knowledge about the mutual relationship between humans and nature. A few years later it defined the concept of Biosphere Reserve. In 1972, the United Nations held the first international Conference on the Human Environment in Stockholm, prepared by Rene Dubos and other experts. This conference was the origin of the phrase **"Think Globally, Act Locally"**.

Terminologies

a) Species population denotes all individuals of a species.
b) Metapopulation refers to a set of spatially disjunct populations, among which there is some immigration.
c) Population denotes a group of conspecific individuals that is demographically, genetically, or spatially disjunct from other groups of individuals.
d) Aggregation refers to a spatially clustered group of individuals.
e) Deme means a group of individuals more genetically similar to each other than to other individuals, usually with some degree of spatial isolation as well.
f) Local population refers to a group of individuals within an investigator-delimited area smaller than the geographic range of the species and often within a population (as defined above). A local population could be a disjunct population as well.
g) Subpopulation denotes an arbitrary spatially delimited subset of individuals from within a population (as defined above).