ECOLOGY

Ecology is defined "as a scientific study of the relationship of the living organisms with each other and with their environment."

The classical texts of the Vedic period such as the Vedas, the Samhitas, the Brahmanas and the Aranyakas-Upanishads contain many references to ecological concepts .The Indian treatise on medicine, the Caraka- Samhita and the surgical text Susruta-Samhita. contain classification of animals on the basis of habit and habitat, land in terms of nature of soil, climate and vegetation; and description of plants typical to various localities.

Caraka- Samhita contains information where air, land, water and seasons were indispensable for life and that polluted air and water were injurious for health.

The environment is defined as 'the sum total of living, non-living components; influences and events, surrounding an organism.

Components of Environment

1. Abiotic – Energy, Radiation, TEMP, Water, etc.

2. Biotic- plants, animals, man, DECOMPOSER ETC.

Diesel engine exhaust fumes can cause cancer, humans" and it belong to the same potentially deadly category as asbestos, arsenic and 'mustard gases.

Six main levels of organisation of ecology are:

1. Individual- Organism is an individual living being that has the ability to act or function independently.

2. Population-Population is a group of organisms usually of the same species, occupying a defined area during a specific time,

3. Community- Communities in most instances are named after the dominant plant form

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(species). A community is not fixed or rigid; communities may be large or small.

Types of Community-

On the basis of size and degree of relative independence communities may be divided into two types-

(a) Major Community

These are large-sized, well organized and relatively independent. They depend only on the sun's energy from outside and are independent of the inputs and outputs from adjacent communities.

E.g: tropical ever green forest in the North-East

(b) Minor Communities

These are dependent on neighbouring communities and are often called societies.

They are secondary aggregations within a major community and are not therefore completely independent units as far as energy and nutrient dynamics are concerned.

e.g: A mat of lichen on a cow dung pad.

The environmental factors determine the characteristic of the community as well as the pattern of organisation of the members in the community

The characteristic pattern of the community is termed as structure which is reflected in the roles played by various population, their range, the type of area they inhabit, the diversity of species in the community and the spectrum of interactions between them

Eco-System-An ecosystem is defined as a structural and functional unit of biosphere consisting of community of living beings and the physical environment, both interacting and exchanging materials between them. It

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includes plants, trees, animals, fish, birds, micro-organisms, water, soil, and people.

When an ecosystem is healthy (i.e. sustainable) it means that all the elements live in balance and are capable of reproducing themselves

Components of Ecosystem

The components of the ecosystem is categorised into abiotic of non-living and biotic of living components. Both the components of ecosystem and environment are same.

1. Abiotic Components

the inorganic and non-living parts of the world. consists of soil, water, air, and light energy etc. involves a ,large number of chemicals like oxygen, nitrogen-, etc. and physical processes including volcanoes, earthquakes, floods, forest fires, climates, and weather conditions.

Abiotic factors are the most important determinants of where and how well an organism exists in its environment. Although these factors interact with each other, one single factor can-limit the range of an organism.

a) Energy

Energy from the sun is essential for maintenance of life. Energy determines the distribution of organisms in the environment.

b) Rainfall

c) Temperature :-Temperature is a critical factor of the environment which greatly influences survival of organisms. Organisms can tolerate only a certain range of temperature and humidity.

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d) Atmosphere :It is made up of 21% oxygen, 78% nitrogen , 0.038% carbon dioxide and other inert gases (0.93% Argon, Neon etc).

e) Substratum :Land is covered by soil and a wide variety of microbes, protozoa, fungi and small animals (invertebrates) thrive in it

f) Materials:

(i) Organic compound

Such as proteins, carbohydrates, lipids, humic substances are formed from inorganic compound on decomposition.

(ii) Inorganic compound

Such as carbon, carbon dioxide, water, sulphur, nitrates, phosphates, and ions of various metals are essential for organisms to survive.

g) Latitude and altitude

Latitude has a strong influence on an area's temperature, resulting in change of climates such as polar, tropical, and temperate. These climates determine different natural biomes. From sea level to highest peaks, wild life is influenced by altitude. As the altitude increases, the air becomes colder and drier, affecting wild life accordingly.(wild life decrease as altitude increase)

2. Biotic Components :Biotic components include living organisms comprising plants, animals and microbes and are classified according to their functional attributes into producers and consumers.

Primary producers - Autotrophs (self-nourishing) Primary producers are basically green plants (and certain bacteria and algae). They synthesise carbohydrate from simple inorganic raw materials like carbon dioxide and water in the presence of sunlight by the process of photosynthesis for themselves, and supply indirectly to other non- producers.

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In terrestrial ecosystem, producers are basically herbaceous and woody plants, while in aquatic ecosystem producers are various species of microscopic algae.

b) Consumers — Heterotrophs or phagotrophs (other nourishing)

Consumers are incapable of producing their own food (photosynthesis).

They depend on organic food derived from plants, animals or both.

Consumers can be divided into two broad groups

(i) Macro consumers- They feed on plants or animals or both and are categorised on the basis of their food sources.

Herbivores are primary consumers which feed mainly on plants e.g. cow, rabbit.

Secondary consumers feed on primary consumers e.g. wolves.

Carnivores which feed on secondary consumers are called tertiary consumers e.g. lions which can eat wolves.

Omnivores are organisms which consume both plants and animals e.g. man.

(ii) Micro consumers - Saprotrophs (decomposers or osmotrophs)

They are bacteria and fungi which obtain energy and nutrients by decomposing dead organic substances (detritus) of plant and animal origin.

The products of decomposition such as inorganic nutrients which are released in the ecosystem are reused by producers and thus recycled.

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