ECOTONE:

An ecotone is an area that acts as a boundary or a transition between two ecosystems. A common example could be an area of marshland between a river and its riverbank. Ecotones are of great environmental importance. Because the area is a transition between two ecosystems or biomes, it is natural that it contains a large variety of species of fauna and flora as the area is influenced by both the bordering ecosystems.

Examples of ecotones include marshlands (between dry and wet ecosystems), mangrove forests (between terrestrial and marine ecosystems), grasslands (between desert and forest), and estuaries (between saltwater and freshwater). Mountain ranges can also create ecotones due to the changes in the climatic conditions on the slopes.

Characteristics of Ecotones

- It may be wide or narrow.
- It is a zone of tension (as it has conditions intermediate to the bordering ecosystems).
- It could contain species that are entirely different from those found in the bordering systems.
- Ecotones can be natural or man-made. For example, the ecotone between an agricultural field and a forest is a man-made one.

Edge Effect

Edge effects refer to the changes in population or community structures that occur at the boundary of two habitats. Generally, there is a greater number of species found in these regions (ecotones) and this is called edge effect. The species found here are called **edge species**.

Importance of Ecotone

1. They have a greater variety of organisms.
2. They also offer a good nesting place for animals coming in search of a nesting place or food.
3. They serve as a bridge of gene flow from one population to another because of the larger genetic diversity present.
4. They can act as buffer zones offering protection to the bordering ecosystems from possible damage. For example, a wetland can absorb pollutants and prevent them from seeping into the river.
5. Ecotones are also a sensitive indicator of global climate change. A shifting of boundaries between ecosystems is thought to be due to climate change. So, scientists and environmentalists are studying ecotones with greater interest now.

BIOSPHERE-

Biosphere**,** relatively thin life-supporting stratum of Earth's surface, extending from a few kilometres into the atmosphere to the deep-sea vents of the ocean. The biosphere is a global ecosystem composed of living organisms (biota) and the abiotic (nonliving) factors from which they derive energy and nutrients.

Before the coming of life, Earth was a bleak place, a rocky globe with shallow seas and a thin band of gases—largely carbon dioxide, carbon monoxide, molecular nitrogen, hydrogen sulfide, and water vapour. It was a hostile and barren planet. This strictly inorganic state of the Earth is called the geosphere; it consists of the lithosphere (the rock and soil), the hydrosphere (the water), and the atmosphere (the air). Energy from the Sun relentlessly bombarded the surface of the primitive Earth, and in time—millions of years—chemical and physical actions produced the first evidence of life: formless, jellylike blobs that could collect energy from the environment and produce more of their own kind. This generation of life in the thin outer layer of the geosphere established what is called the biosphere, the "zone of life," an energy-diverting skin that uses the matter of the Earth to make living substance.

The biosphere is a system characterized by the continuous cycling of matter and an accompanying flow of solar energy in which certain large molecules and cells are self-reproducing. Water is a major predisposing factor, for all life depends on it. The elements carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulphur, when combined as proteins, lipids, carbohydrates, and nucleic acids, provide the building blocks, the fuel, and the direction for the creation of life. Energy flow is required to maintain the structure of organisms by the formation and splitting of phosphate bonds. Organisms are cellular in nature and always contain some sort of enclosing membrane structure, and all have nucleic acids that store and transmit genetic information.

All life on Earth depends ultimately upon green plants, as well as upon water. Plants utilize sunlight in a process called photosynthesis to produce the food upon which animals feed and to provide, as a by-product, oxygen, which most animals require for respiration. At first, the oceans and the lands were teeming with large numbers of a few kinds of simple single-celled organisms, but slowly plants and animals of increasing complexity evolved. Interrelationships developed so that certain plants grew in association with certain other plants, and animals associated with the plants and with one another to form communities of organisms, including those of forests, grasslands, deserts, dunes, bogs, rivers, and lakes. Living communities and their nonliving environment are inseparably interrelated and constantly interact upon each other. For convenience, any segment of the landscape that includes the biotic and abiotic components is called an ecosystem. A lake is an ecosystem when it is considered in totality as not just water but also nutrients, climate, and all of the life contained within it. A

given forest, meadow, or river is likewise an ecosystem. One ecosystem grades into another along zones termed ecotones, where a mixture of plant and animal species from the two ecosystems occurs. A forest considered as an ecosystem is not simply a stand of trees but is a complex of soil, air, and water, of climate and minerals, of bacteria, viruses, fungi, grasses, herbs, and trees, of insects, reptiles, amphibians, birds, and mammals. Stated another way, the abiotic, or nonliving, portion of each ecosystem in the biosphere includes the flow of energy, nutrients, water, and gases and the concentrations of organic and inorganic substances in the environment. The biotic, or living, portion includes three general categories of organisms based on their methods of acquiring energy: the primary producers, largely green plants; the consumers, which include all the animals; and the decomposers, which include the microorganisms that break down the remains of plants and animals into simpler components for recycling in the biosphere. Aquatic ecosystems are those involving marine environments and freshwater environments on the land. Terrestrial ecosystems are those based on major vegetational types, such as forest, grassland, desert, and tundra. Particular kinds of animals are associated with each such plant province.

Ecosystems may be further subdivided into smaller biotic units called communities. Examples of communities include the organisms in a stand of pine trees, on a coral reef, and in a cave, a valley, a lake, or a stream. The major consideration in the community is the living component, the organisms; the abiotic factors of the environment are excluded.

A community is a collection of species populations. In a stand of pines, there may be many species of insects, of birds, of mammals, each a separate breeding unit but each dependent on the others for its continued existence. A species, furthermore, is composed of individuals, single functioning units identifiable as organisms. Beyond this level, the units of the biosphere are those of the organism: organ systems composed of organs, organs of tissues, tissues of cells, cells of molecules, and molecules of atomic elements and energy. The progression, therefore, proceeding upward from atoms and energy, is toward fewer units, larger and more complex in pattern, at each successive level.

The structure of Biosphere has three components: Abiotic, Biotic and energy components.

I. Abiotic Components: It consists of all non-living elements which are essential for the survival of all living organisms. It has lithosphere, atmosphere and hydrosphere. Mineral nutrients, gases and water are three basic requirements of organic life.

II. Biotic Components: It includes Plants, animals and human beings to make biotic components of environment. there are three sub-system:

- Plants:They are very important part of biotic components. They are primary producers of food through process of photosynthesis. They are called autotrophs.
- Animals: They are main consumers of plant produce, hence known as Heterotrophs. They use organic matter produced by plants and transform the food into energy (used in growth and development).
- Micro-organism: They act as decomposers of dead plants and animals.

III. Energy : It is vital component of biosphere which is essential for reproduction and generation of all biological life on Earth.

ECOSYSTEM:

The term 'Ecosystem' was first coined by Sir Arthur George Tansley in 1935. An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic or living, parts, as well as abiotic factors, or non-living parts. Biotic factors include plants, animals, and other organisms. Abiotic factors include rocks, temperature, and humidity.

Every factor in an ecosystem depends on every other factor, either directly or indirectly. A change in the temperature of an ecosystem will often affect what plants will grow there, for instance. Animals that depend on plants for food and shelter will have to adapt to the changes, move to another ecosystem, or perish.

Ecosystems can be very large or very small. Tide pools, the ponds left by the ocean as the tide goes out, are complete, tiny ecosystems. Tide pools contain seaweed, a kind of algae, which uses photosynthesis to create food. Herbivores such as abalone eat the seaweed. Carnivores such as sea stars eat other animals in the tide pool, such as clams or mussels. Tide pools depend on the changing level of ocean water. Some organisms, such as seaweed, thrive in an aquatic environment, when the tide is in and the pool is full. Other organisms, such as hermit crabs, cannot live underwater and depend on the shallow pools left by low tides. In this way, the biotic parts of the ecosystem depend on abiotic factors.

The whole surface of Earth is a series of connected ecosystems. Ecosystems are often connected in a larger biome. Biomes are large sections of land, sea, or atmosphere. Forests, ponds, reefs, and tundra are all types of biomes, for example. They're organized very generally, based on the types of plants and animals that live in them. Within each forest, each pond, each reef, or each section of tundra, you'll find many different ecosystems.

The biome of the Sahara Desert, for instance, includes a wide variety of

ecosystems. The arid climate and hot weather characterize the biome. Within the Sahara are oasis ecosystems, which have date palm trees, freshwater, and animals such as crocodiles. The Sahara also has dune ecosystems, with the changing landscape determined by the wind. Organisms in these ecosystems, such as snakes or scorpions, must be able to survive in sand dunes for long periods of time. The Sahara even includes a marine environment, where the Atlantic Ocean creates cool fogs on the Northwest African coast. Shrubs and animals that feed on small trees, such as goats, live in this Sahara ecosystem.

Even similar-sounding biomes could have completely different ecosystems. The biome of the Sahara Desert, for instance, is very different from the biome of the Gobi Desert in Mongolia and China. The Gobi is a cold desert, with frequent snowfall and freezing temperatures. Unlike the Sahara, the Gobi has ecosystems based not in sand, but kilometers of bare rock. Some grasses are able to grow in the cold, dry climate. As a result, these Gobi ecosystems have grazing animals such as gazelles and even takhi, an endangered species of wild horse.

Even the cold desert ecosystems of the Gobi are distinct from the freezing desert ecosystems of Antarctica. Antarcticas thick ice sheet covers a continent made almost entirely of dry, bare rock. Only a few mosses grow in this desert ecosystem, supporting only a few birds, such as skuas.

ECOLOGY:

Ecology is the study of organisms in relation to the surroundings in which they live. These surroundings are called the environment of the organism. This environment is made up of many different components, including other living organisms and their effects, and purely physical features such as the climate and soil type. (Chapman, Ecology, ed 2000)

The word 'Ecology' is derived from the Greek Oikos, meaning "house" or "place to live". Literally ecology is defined as the study of the relation of organisms or group of organisms to their environment, or the science of the interrelations between living organisms and their environment. The modern emphasis is to see ecology as concerned especially with study of the structure and functions of nature, it being understood that mankind is a part of nature. To many ,'ecology' now stands for 'the totality of man and environment.' In 'Ecology' the term 'population', originally coined to denote a group of people, is broadened to include groups of individuals of any kind of organism. Likewise 'community' in the ecological sense (sometimes designated as "biotic community") includes all of the population occupying a given area. The community and the nonliving environment function together as an ecological system or 'ecosystem'.

Ecology is like an enormous jigsaw puzzle. Each organism has requirements for life which interlock with those of many other individuals in the area. Some of these individuals belong to the same species, but most are very different organism with very different ways of living or interacting. The following figure is a diagrammatic representation of this interlocking jigsaw. It illustrates some of the ways in which a single individual fits in with others. In this case an animal is represented which catches other animals for food (it is a predator) and which in turn is hunted and may be killed by another species of predator.

During the animal's lifetime it needs to find a mate of the same species to produce offspring. During its life it also competes with other animals (competitors) for food and will probably catch diseases.

The ability of the animals to avoid the predator, catch its prey withstand diseases and so on will depend on the relationships it has with the organisms around it. Its life will also be affected by the weather, time of year and the quality of resting or sleeping sites. In fact, this simplified example is already becoming complicated as more as the pieces of the puzzle are added. The study of these ecological relationship may be done in two branches of ecology as followed:

Autecology- During the animal's lifetime it needs to find a mate of the same species to produce offspring. During its life it also competes with other animals (competitors) for food and will probably catch diseases. The ability of the animals to avoid the predator, catch its prey withstand diseases and so on will depend on the relationships it has with the organisms around it. Its life will also be affected by the weather, time of year and the quality of resting or sleeping sites. In fact, this simplified example is already becoming complicated as more as the pieces of the puzzle are added. The study of these ecological relationship may be done in two branches of ecology as followed:

Synecology- Synecology deals with the study of groups of organisms which are associated together as a unit. Thus, if a study is made of the relation of a pine tree(or pine tree in general) to the environment, the work would be autecological in nature. If the study concerned the forest in which the pine tree lives, the approach would be synecological.

In the former instance attention is sharply focused on a particular organisms with the purpose of seeing how it fits into the general ecological picture much as one might focus attention on a particular object in a painting. In the latter instance the picture as a whole is considered much as one might study the composition of a painting.