VIVEKANANDA COLLEGE
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NAAC ACCREDITED 'A' GRADE

Topic: **Habitat and Niche; Ecotone and Edge-effect**

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PRELIMINARY IDEA ON HABITAT; NICHE; ECOTONE; EDGE-EFFECT

Habitat: A habitat is the natural place where an organism dwells. It actually represents a particular set of environmental factors in a given locality suitable for the successful growth an organism. It is therefore used in a more concrete sense than environment. Temperature, sunlight, rainfall, types of soil, etc. and other abiotic factors determine the presence of organisms present in an area. These factors prevailing in an area determine the best-suited species for that environment.

Habitat is the best-suited condition for a species and provides ideal conditions for a species to grow, adapt, reproduce and flourish. It is the energy or nutrient providing area for an organism. Habitat of a species describes the totality of abiotic factors to which the species is exposed in the area; examples of habitat include desert, ponds, freshwater lake, ocean, mountains, grassland, forest, etc.

Niche: **Joseph Grinnel coined the term "Niche"**. He viewed the niche as the functional role and position of an organism in its community. Elton in 1927, defined niche as "the position or status of an organism within its community and ecosystem resulting from the organism's structural and functional adaptations". He described a niche as the distributional unit specific to each species. He emphasized that no two species living in the same territory can occupy the same ecological niche for long.

Renowned ecologist E.P. Odum (1959**)** defined the ecological niche as *"the position or status of an organism within its community and ecosystem resulting from the organism's structural adaptations, physiological responses, and specific behaviour (inherited and/or learned)."* He emphasized that *"the ecological niche of an organism depends not only on where it lives but also on what it does."* The place an organism lives, or where one would go to find it, is its habitat. For Odum ***the habitat is the organism's "address," whereas the niche is its "profession".*** The ecological niche not only involves the physical space occupied by an organism but it also describes the functional role or place of a species in its community structure. This includes everything related to how it influences a community, i.e. what it eats, where it lives, what it does, the trophic position occupied, etc. Niche describes how a species

contributes to the energy flow of the system, how it gains energy and supplies it further in an ecosystem.

There are three aspects of an ecological niche:

1. **Spatial or habitat niche:** It accounts for the physical space occupied by an organism. This explains the different microhabitat owned by several species having identical general habitat.
2. **Trophic Niche:** It tells about the functional role or trophic position occupied by a species. It explains how different species share the same habitat but occupy different trophic niches.eg. Darwin's finches of Galapagos Islands. These birds belong to the same genera and live in the same general habitat but differ in their eating habits, i.e. trophic position. One species is vegetarian feeding on buds and fruits and others are insect eaters, feeding on insects of different sizes. There is a woodpecker finch, which has a wood-pecking beak.
3. **Hypervolume or multidimensional niche:** It represents the position of a species in the environmental gradient. There are a large number of environmental factors, both abiotic and biotic, that affect the population. This is the fundamental niche of the species and refers to the totality of abiotic and biotic factors to which a given species is uniquely adapted.

The difference between habitat and niche are:

Habitat	**Niche**
A habitat is a particular place where organisms live, i.e. address	A niche defines a particular role played by organisms in an ecosystem, i.e. profession
Habitat is not a species-specific and many species can occupy the same habitat	Niche is a species-specific and it supports only a single species
Habitat consists of several niches	Niche is specific to a particular species, which may overlap with a similar niche but must have distinct differences
Habitat is a superset of niche	Niche is a subset of habitat
Examples: desert, ocean, mountains, grassland, forest, etc.	Examples: different trophic position occupied by Darwin's finches

Niche is specific to a particular species, no two species can fill the same niche. The two similar niches can overlap but there must be distinct differences to avoid competition for the same resources.

Ecotone and Edge Effect

Ecotone: In nature there is no sharp line to indicate the end of one community and the beginning of the other. When two communities are adjacent, there is a transitional area where the integrating communities intermingle; this transitional zone is called **Ecotone or tension zone**. The transition area between ecosystems like **grassland** and **forest** forms regional ecotone and between forest and field forms a local Ecotone which can be wide or narrow. This Ecotone may appear as clear boundaries with homogenous surfaces or in gradual blending forms between two communities. Formation of Ecotone .When **physical environment changes**, example from forest to clean land, a clear and sharp interface is created between two communities. Moreover, gradual blended interface forms when unique local species and species common to both interacting community found together for example in Mountain ranges. **Most Wetlands are ecotones.**

Type of Ecotone

a. Halocline (gradient salinity)

b. Thermocline (gradient in temperature)

c. Pycnocline (water density gradient)

d. Chemocline (chemical gradient)

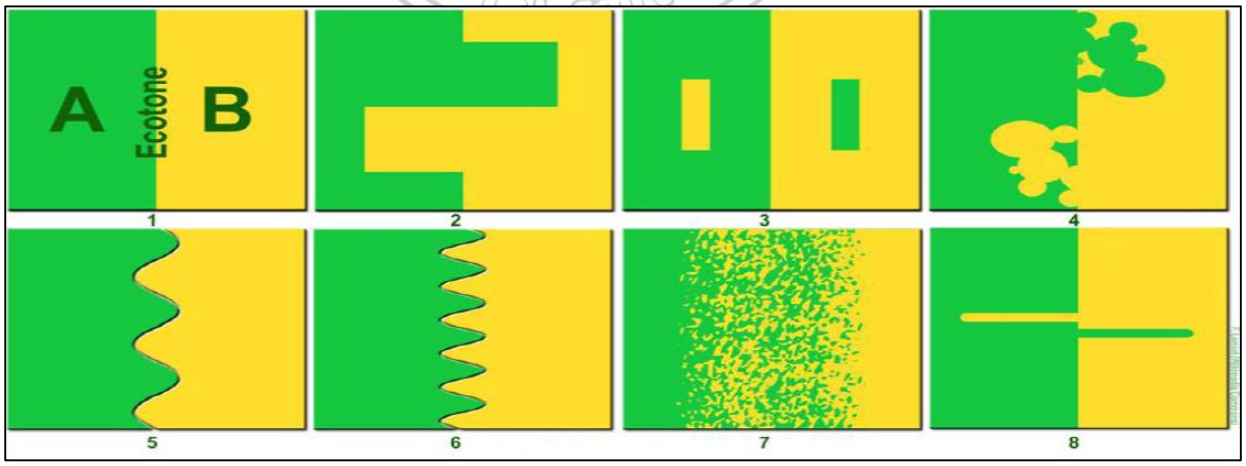

Figure: Different forms of Ecotone

Edge Effects: In ecology, ecotone exhibit changes in population constituting community structure allowing for greater biodiversity at the boundaries of the merged habitats and this is called as **edge effects**. The Ecotone is colonized by the species that are commonly found in the communities of both sides, as well as some versatile species of plants and animals. As a rule, this region contains more species and often denser populations than the bordering communities. This is known as '**principle of edges'**. This edge effect is due to wider range of suitable environmental conditions. When two habitats are separated by wise edge effects called Ecotone, then they develop their own type of vegetation and environmental conditions.

Types of Edge effects:

1. **Narrow Edge effect**: Abrupt ending of one habitat from where another habitat begins is a narrow edge effect.

2. **Wide Edge effect:** Significant distance between two habitats is exhibited as Wide edge effect or Ecotone.

3. **Induced Edge effect:** The structural changes are induced over time either by the human interference or natural disturbances (eg. fire) and leads to induced edge effect.

4. **Inherent Edge effect:** The border between two habitats are separated and stabilized by natural features are called as Inherent edge effect.

5. **Perforated Edge effect:** The distance between two habitats has gaps in them which help in assisting other habitats.

6. **Convoluted Edge effect:** A nonlinear division of two habitats leads to convoluted edge effect.

Edge effects on Succession When vegetation spreads the succession is affected by edge effects. Different species colonizes to central portions or to the edge leading to differential species distribution. With the change in orientation the edge also changes, thus, participating in different vegetation patterns.