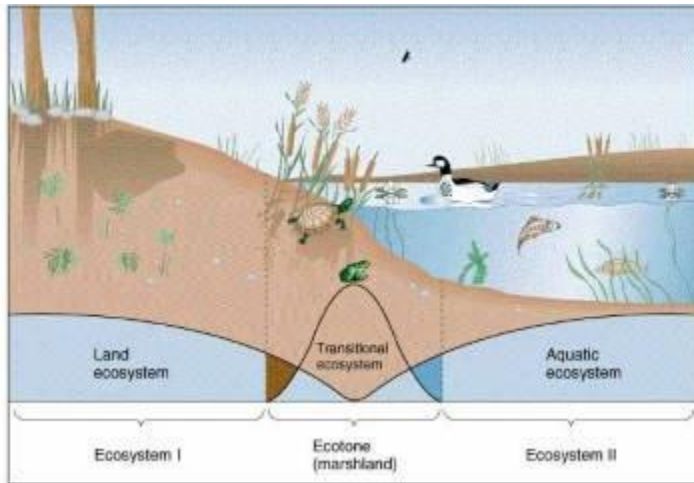


Ecotone

- An ecotone is a **zone of junction** or a **transition area** between two biomes [diverse ecosystems]. It is where two communities meet and integrate.
- For e.g. the **mangrove forests** represent an ecotone between marine and terrestrial ecosystem. Other examples are **grassland** (between forest and desert), **estuary** (between fresh water and salt water) and river bank or marsh land (between dry and wet).



Picture Credits: <https://ecological.files.wordpress.com/2013/12/ecotone.jpg>

Characteristics of Ecotone

- It may be narrow (between grassland and forest) or wide (between forest and desert).
- As it is a zone of transition, it has conditions intermediate to the adjacent ecosystems. Hence it is a **zone of tension**.
- Usually, the number and the population density of the species of an outgoing community decreases as we move away from community or ecosystem.
- A well-developed ecotones contain some organisms which are entirely different from that of the adjoining communities.

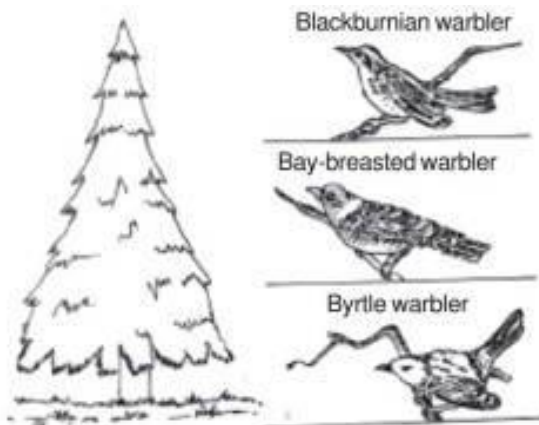
Edge Effect – Edge Species

- In ecology, edge effects refer to the changes in population or community structures that occur at the boundary of two habitats (ecotone).
- Sometimes the number of species and the population density of some of the species in the ecotone is much greater than either community. This is called **edge effect**.
- The organisms which occur primarily or most abundantly in this zone are known as **edge species**.

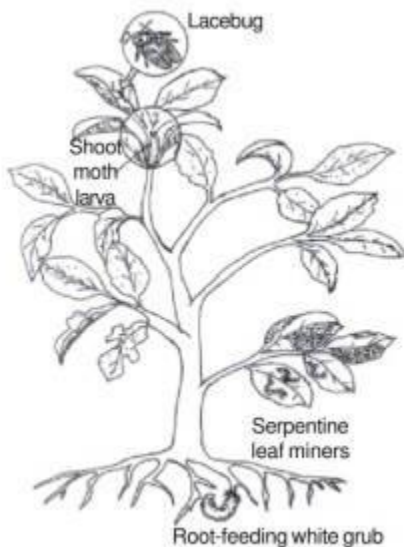
- In the terrestrial ecosystems edge effect is especially applicable to **birds**. For example the density of birds is greater in the mixed habitat of the ecotone between the forest and the desert.

Ecological Niche

- Niche refers to the **unique functional role and position of a species** in its habitat or ecosystem.
- In nature, many species occupy the same habitat but they perform different functions.



The three species of warbler birds search for insects as food in the forest at different levels in the tree and so occupy different niches



Different species of insects feeding on different parts of the same plant

- The functional characteristics of a species in its habitat is referred to as “niche” in that common habitat.
- Habitat of a species is like its ‘address’ (i.e. where it lives) whereas niche can be thought of as its “profession” (i.e. activities and responses specific to the species).

- A niche is unique for a species while many species share the habitat. No two species in a habitat can have the same niche. This is because of the **competition** with one another until one is displaced.
- For example, a large number of different species of insects may be pests of the same plant but they can co-exist as they feed on different parts of the same plant.
- A species' niche includes all of its interactions with the biotic and abiotic factors of its environment [habitat niche – where it lives, food niche – what it eats or decomposes & what species it competes with, reproductive niche – how and when it reproduces, physical & chemical niche – temperature, land shape, land slope, humidity & other requirement].
- An ecological niche describes how an organism or population responds to the distribution of resources and competitors (for example, by growing when resources are abundant, and when predators, parasites and pathogens are scarce) and how it in turn alters those same factors (for example, limiting access to resources by other organisms, acting as a food source for predators and a consumer of prey).
- Niche plays an important role in **conservation of organisms**. If we have to conserve species in its native habitat we should have knowledge about the niche requirements of the species and should ensure that all requirements of its niche are fulfilled.
-

Ecotone – zone of transition between two ecosystems. E.g. grasslands, mangroves etc.

Habitat – surroundings in which an organism lives (home).

Home Range – A home range is the area in which an animal lives and moves on a daily or periodic basis (a little bigger than habitat – home → office → home).

Aspects or types of ecological niche : The three aspects of ecological niche are

1) Spatial or habitat niche : According to this, a niche is the “microhabitat in which a species lives”. It represents the physical space occupied by an organism. According to this, no two species can occupy the same habitat. E.g. Catla, Rohu, Mrigal live in same pond, but they occupy different niche (surface, mid-column and bottom layer)

2) Trophic niche : According to this, a niche is the “functional status of an organism in its community”. Thus it describes the trophic position of an organism in an ecosystem. E.g. Two weaver birds *Ploceus collaris* and *P. melanocephalus*, live in the same nest but one feeds on seeds and the other on insects.

3) Multidimensional or hypervolume niche : According to this, a niche can be a multidimensional or hyper-volume space. The activity range of any species is dependent on all the dimensions of the

environment. These dimensions include physical and chemical parameters such as temperature, humidity, salinity, oxygen concentration etc. and biological factors such as prey species. It led to the concepts of niche breadth and niche overlap.

4) Fundamental niche and realised niche: Fundamental niche is the niche that an organism occupies in the absence of any competitors and predators.

Realised niche is referred to as the role an organism actually plays in the community. For example the outcome of inter-specific competition leads to either extinction or the development of differences allowing coexistence.

Advantages of ecological niche: 1) Animals can escape competition by occupying different ecological niches. 2) Segregation of different species in a particular niche results in full exploitation of all available resources.

Ecological Niche

An ecological niche describes the functional position and role of an organism within its environment

- It consists of all physical and biological conditions which determine the organism's survival and reproductive prospects

An ecological niche will be comprised of various components, including:

- The *habitat* in which an organism lives
- The *activity patterns* of the organism (e.g. periods of time during which it is active)
- The *resources* it obtains from the environment (e.g. food sources, territorial boundaries, etc.)
- The *interactions* that occur with other species in the community (e.g. predator-prey relationships, competition, etc.)

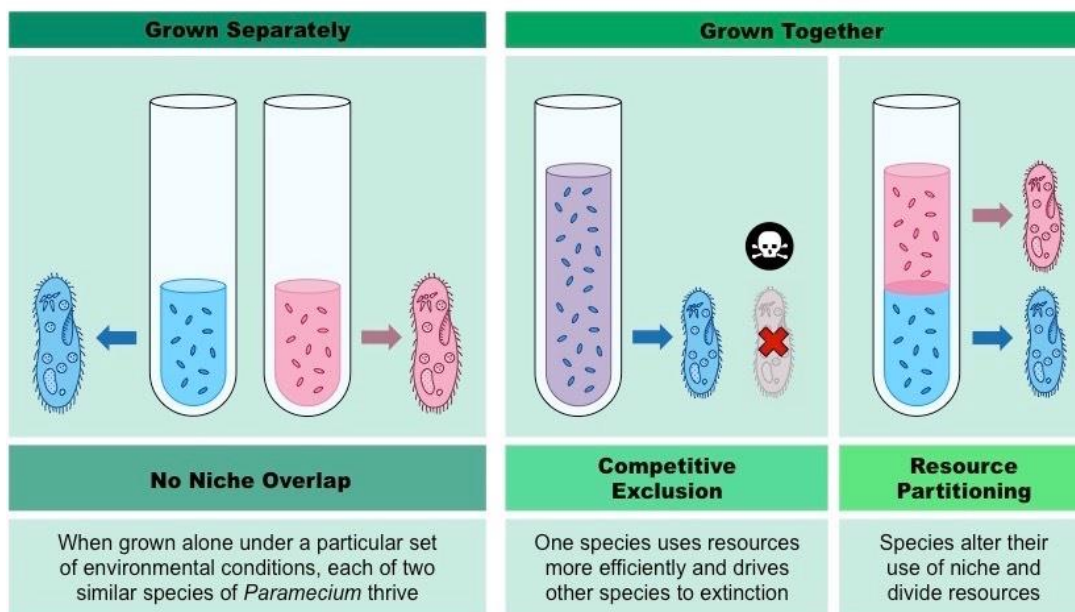
If two distinct species share an identical niche, there will be interspecific competition for available space and resources

- This competition between the two species will result in the fitness of one being lowered by the presence of the other
- Inevitably, the less well-adapted species will struggle to survive and reproduce – it will eventually be eliminated from the niche

Interspecific competition within a shared niche will typically prompt one of two responses:

- *Competitive exclusion* – One species uses the resources more efficiently, driving the other species to local extinction
- *Resource partitioning* – Both species alter their use of the habitat to divide resources between them (i.e. niche separation)

Niche Differentiation



Some species may not be able to occupy their entire niche due to the presence or absence of other species

- Hence a species may occupy a smaller subset of their niche than is theoretically possible (fundamental vs realised niche)

Fundamental Niche

A fundamental niche is the entire set of conditions under which an organism can survive and reproduce (where it *could* live)

- It is the *theoretical* habitat and may not be fully occupied due to the presence of competing species

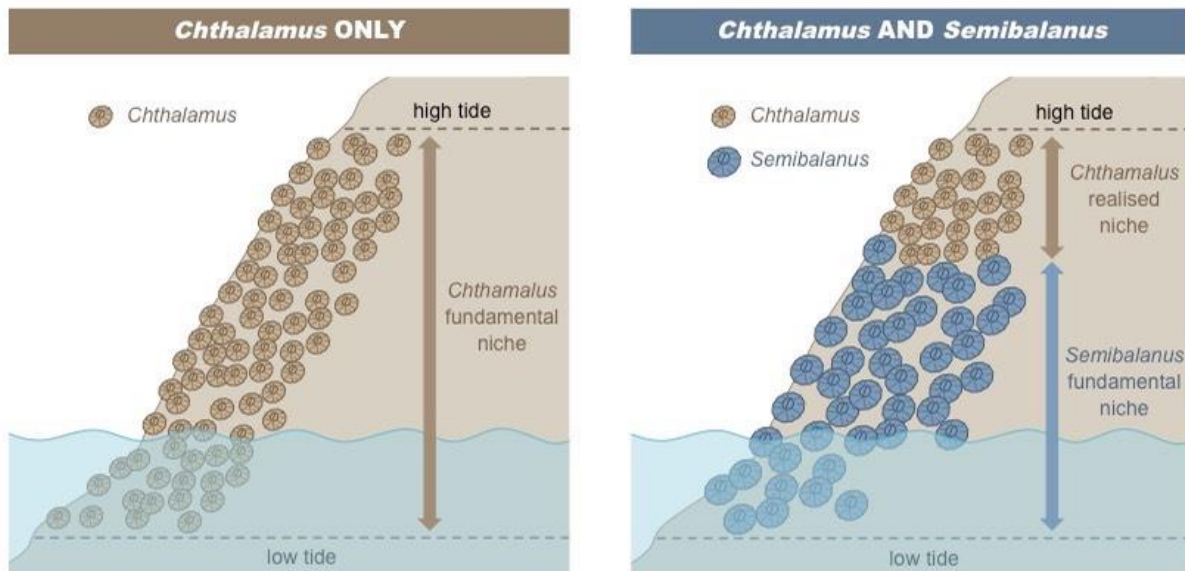
- In a rocky shore environment, the *Chthalamus* barnacle can potentially occupy the entire rocky shore (if in isolation)

Realised Niche

A realised niche is the set of conditions used by an organism after including interactions with other species (where it *does* live)

- It is the *actual* habitat that is completely occupied by an organism in the presence of competing species
- In a rocky shore environment, the *Chthalamus* barnacle only occupies regions where the *Semibalanus* barnacle is absent

Fundamental vs Realised Niche – Rocky Shore Data



Basis for Comparison	Habitat	Niche
Meaning	A habitat is an area, where a species lives and interact with the other factors.	A niche is an ideology, of how an organisms lives or survive in the provided environmental conditions.
Consist of	Habitat consist of numerous niches.	Niches does not contains such components.
It includes	Affect of temperature, rainfall and other abiotic factors.	Flow of energy from one organisms to other through ecosystem.
Examples	Desrets, oceans, forest, rivers,	It is a part of habitat only, where shelter for

Basis for Comparison	Habitat	Niche
	mountains, etc. are examples of habitat.	living being can be furnished.
Supports	Habitat supports numerous species at a time.	Niche supports a single species at a time.
What it is	Superset	Subset
Nature	Habitat is a physical place.	Niche is an activity performed by organisms.
Specificity	Habitat is not species specific.	Niche is species specific.