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Ecological Biogeography Concept of Habitat and Niche

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Habitat :

- Individuals, species, and populations, both Marine and terrestrial, tend to live in particular places . These places are habitats.
- A specific set of environmental conditions – radiation and light,temperature, moisture, wind,gravity, salinity, currents, topography,soil, substrate, geomorphology, human disturbance etc, characterize each habitat.
- simply put habitat is the address of a particular species where it lives.
- Habitats come in all shapes and sizes, occupying the full sweep of geographical scales. They Range from small (microhabitats), through medium (mesohabitats) and large (macrohabitats), to very large (megahabitats).

Table 5.1 Habitat scales

Scale[a]	*Approximate area (km²)*	*Terminology applied to landscape units at same scale*[b]		
		Fenneman (1916)	*Linton (1949)*	*Whittlesey (1954)*
Microhabitat (small)	< 1	–	Site	–
Mesohabitat (medium)	1–10	–	–	–
	10–100	–	Stow	Locality
	100–1,000	District	Tract	District
	1,000–10,000	Section	Section	–
Macrohabitat (large)	10,000–100,000	Province	Province	Province
	100,000–1,000,000	Major division	Major division	Realm
Megahabitat (very large)	> 1,000,000	–	Continent	–

Notes: a These divisions follow Delcourt and Delcourt (1988). b The range of areas associated with these regional landscape units are meant as a rough-and-ready guide rather than precise limits

Landscape - Landscape elements:

Landscape ecologists, who have an express interest in the geographical dimension of ecosystems, recognize **three levels of 'habitat' – region,landscape, and landscape element. These correspond to large-scale, medium-scale, and small scale habitats.**

Landscape elements are similar to microhabitats, but a little larger. They are fairly uniform pieces of land, no smaller than about 10 m, which form the building blocks of landscapes and regions.

They are also called ecotopes, biotopes, geotopes, facies, sites, tesserae, landscape units, landscape cells, and landscape prisms. These terms are roughly equivalent to landscape element, but each has its own meaning (Forman 1995; Huggett 1995).

Landscape elements are made of individual trees, shrubs, herbs, and small buildings. There are three basic kinds of landscape element patches, corridors, and background matrices :

- Patches are fairly uniform (homogeneous) areas that differ from their surroundings. Woods, fields, ponds and houses are all patches.
- Corridors are strips of land that differ from the land to either side. They may interconnect to form networks. Road, rivers, bridges are corridors.
- Background matrixes are the background ecosystems or land-use types in which patches and corridors are set. Examples are deciduous forest and areas of arable cultivation.

Landscapes and regions

Landscape elements combine to form landscapes.

A landscape is a mosaic, an assortment of patches and corridors set in a matrix, not bigger than about 10,000 km2.

It is ‘a heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout’(Forman and Godron 1986).

Landscapes combine to form regions, more than about 10,000 km2 in area. They are collections of landscapes sharing the same macroclimate. All Mediterranean landscapes share a seasonal climate characterised by mild, wet winters and hot,droughty summers.

Habitat specialists and habitat generalists:

Habitat specialists Have very precise living requirements.

Habitat generalists manage to eke out a living in a great array of environments. The human species(Homo sapiens) is the champion habitat generalist– the planet Earth is the human habitat.

Edge species and interior species

Interior species live in the core of a habitat and favour large patches, which have proportionally more core habitat than small patches. They Actively avoid the habitat edges if they are able to meet their resource needs within their territories -ries or home ranges.

English woodland examples include the great spotted woodpecker (Dendrocopos Major) and the nuthatch (Sitta europaea).Edge species use a habitat edge and are more common in small patches.

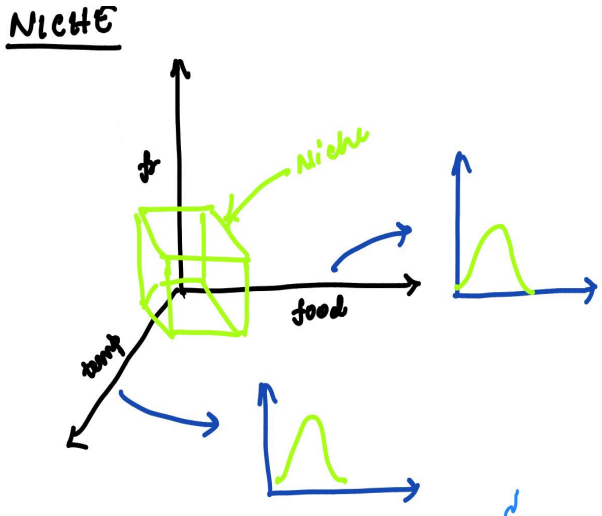
Two types of edge species are recognized, the first of which are intrinsically edge species, and the second of which are ecotonal species (McCollin 1998). Ecotonal species occur near the edge because the edge habitat suits them.

They are not dependent on adjacent habitats for food, shelter, or anything else. Intrinsic edge species live near edges because the adjacent habitat provides resources

Ecological Niche:

An organism's ecological niche(or simply niche) isits 'address' and 'profession'. Its address or home is the habitat in which it lives, and is sometimes called the habitat niche. Its profession or occupation is its position in a food chain, and is sometimes called the functional niche.

A grey wolf's (Canis lupus)habitat niche is cool temperate coniferous forest,and its profession is large-mammal-eater.

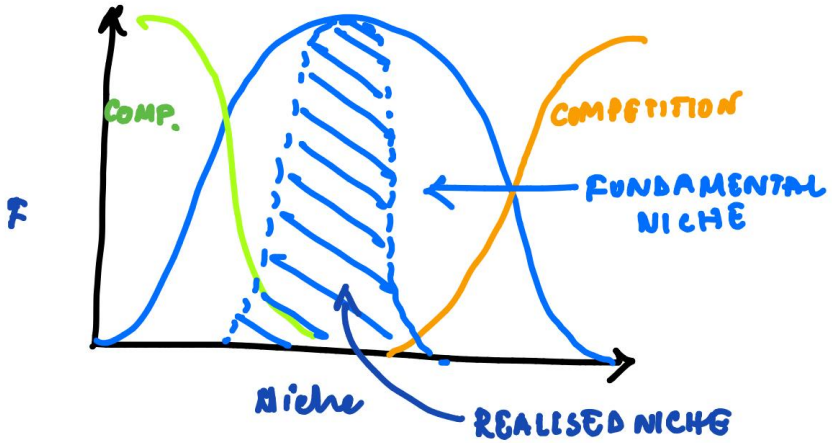


Fundamental Niche and Realised Niche:

A distinction is drawn between the fundamental niche and the realized niche.

The fundamental(or virtual) niche circumscribes where an organism would live under optimal physical conditions and with no competitors or predators.

The realized(or actual) niche is always smaller, and defines the ‘real-world’ niche occupied by an organism constrained by biotic and abiotic limiting factors.



Ecological equivalents

Although only one species occupies each niche, different species may occupy the same or similar niches in different geographical regions.

These species are ecological equivalents or vicars. A grassland ecosystem contains a niche for large herbivores living in herds. Bison and the pronghorn antelope occupy this niche in North America; antelopes, gazelles, zebra, in Africa; wild horses and asses in Europe; the pampas deer in South America; and kangaroos and wallabies in Australia. As this example shows, quite distinct species may become ecological equivalents through historical and geographical accidents.

Life-forms

- The structure and physiology of plants and, to a lesser extent, animals are often adapted for life in a particular habitat.
- These structural and physiological adaptations are reflected in life-form and often connected with particular ecozones.
- The life-form of an organism is its shape or appearance, its structure, its habits, and its kind of life history.
- It includes overall form (such a herb, shrub, or tree in the case of plants), and the form of individual features (such as leaves).Importantly, the dominant types of plant in each ecozone tend to have a life-form finely tuned for survival under that climate.

Plant life-forms A widely used classification of plant life-forms,based on the position of the shoot-apices (the tips of branches) where new buds appear, was designed by Christen Raunkiaer in 1903 (Raunkiaer1934).

It distinguishes five main groups: therophytes, cryptophytes, hemicryptophytes, chamaephytes, and phanerophytes.

A biological spectrum is the percentages of the different life-forms in a given region.

The ‘normal spectrum’ is a kind of reference point; it is the percentages of different life-forms in the world flora. Each ecozone possesses a characteristic biological spectrum that differs from the ‘normal spectrum’.

Tropical forests contain a wide spectrum of life-forms, whereas in extreme climates, with either cold or dry seasons, the spectrum is smaller.

As a rule of thumb, very predictable,stable climates, such as humid tropical climates,support a wider variety of plant life-forms than doregions with inconstant climates, such as arid,Mediterranean, and alpine climates.

Animal life-forms

Animal life-forms, unlike those of plants, tend to match taxonomic categories rather than ecozones.

Most mammals are adapted to basic habitats and may be classified accordingly. They may be adapted for life in water (aquatic or swimming mammals), underground (fossorialor burrowing mammals), on the ground (cursorialor running,and saltatorial or leaping mammals), in trees(arboreal or climbing mammals), and in the air(aerialor flying mammals).

Home range:

Individuals of a species, especially vertebrate species, may have a home range.

A home range is the area traversed by an individual (or by a pair, or by a family group, or by a social group) in its normal activities of gathering food, mating, and caring for young (Burt 1943).

Home ranges may have irregular shapes and may partly overlap, although individuals of the same species often occupy separate home ranges.

Happy reading….