

Topic 2 - Habitat and Lifestyle

The Niche: What Makes an Organism Special?

A **niche** is the role an organism has within a particular ecosystem. An organism's niche includes:

- What it eats
- What eats it
- Its habitat
- Nesting site, range and habits
- What effect it has on the other populations
- What effect it has on the environment

A niche, for a particular organism, can change, depending on the environment in which it is located and the organisms with which it inter-relates.

Variation and Competition

When basic need resources (food, water, sunlight, habitat) are not plentiful, different species compete for the resource. This competition is often not fair – because one species may have a specific variation which will give it an advantage over other species. Adaptations play an important role when competition occurs, because the species that is best suited to survive will. The species who does not 'win' the resource will likely have to switch to a different, less desirable resource in order to survive.

Some species, like warblers, visit Alberta spruce forests and avoid direct competition for the same resource, by practicing **resource partitioning**. This resource sharing enables competing species to share resources by accessing these resources in different ways.

<http://collections.ic.gc.ca/warblers/ident.htm>



The Broad Niche

In northern Canada there are large populations of those species found there, but there are not as many different plant and animal species as there are in other parts of Canada. Large herds of caribou, polar bears, wolves and millions of arctic hare make up the majority of the animals you will find. The species of wolf, *Canis lupus*, and polar bear, *Ursus maritimus*, are also found in Russia and northern Europe. In contrast, hundreds of thousands of species (in small populations) can be found in the rainforests of Central and South America. The reason that Canada supports large populations, with less diversity is the extreme environment and seasonal variations, which restrict their food supply. Organisms living in this ecosystem have a **broad niche** with adaptations that enable them to survive the extreme changes occurring there. These species are considered to be **generalists** – able to spread over large areas.

Diversity in the Tropics: The Dangers of a Narrow Niche

In the tropics, where the temperatures are relatively constant and food supply is stable, organisms are **specialists**. They efficiently survive in their environment, because they have relatively **narrow niches** with adaptations directed toward competing for one dependable food source, type of soil or level of light. This **specialization** allows many different species to coexist in the same area, preventing one species from becoming dominant. The result of this is high diversity with low populations.

A specialist is well adapted to survive in one particular environment. This is considered to be the 'trap of specialization', because, as it is able to survive very well in one environment, it is not able to adapt to extreme change and may not survive when this occurs. The cutting down of the rainforests have meant a loss of diversity, because many organisms have been unable to adapt to this change.

Dependencies Between Species

Each and every species depends on many other species within an environment in order to survive and prosper. Food chains and food webs represent different types of ongoing relationships between and among all the organisms, within a particular environment.

Symbiosis

A different type of interdependence is an association, within a certain population, between members of different species.

There are different types of symbiotic relationships:

- **Commensalism** – in which one of the participating members benefits, but the other does not, and there is no harm done to that organism.
(a bird using a tree to build its nest in) (barnacles on a whale)
- **Mutualism** – both organisms benefit from the relationship.
(mycorrhizae (fungi) help plants absorb water and minerals from the soil, by increasing the surface area of the roots, when they attach themselves to the roots to draw nutrients directly from the plant, also protecting the plant from disease.)
- **Parasitism** – one organism benefits while the other organism (the victim) is harmed. (the parasite usually doesn't kill the host, because the host represents the parasite's food supply.

(tapeworm in a human host) (Mexican bean beetle is a plant parasite)

- **Interspecies competition** happens when two or more species need the same resource. This type of relationship helps to limit the size of populations, of the competing species.

There are many examples of these types of symbiotic relationships, which show the importance of adaptations, helping particular species survive.

Life In the Extreme

Living in an environment at 110°C or -35°C - rare, but possible because of adaptations organisms have to live in these extremes.

Tube worms live on the ocean floor, near black smokers, where volcanic vents make the temperature extremely hot.



Antarctic springtail are arthropods that live in extreme cold, by producing a kind of antifreeze in its tissues.



Snow algae have cell membranes adapted to cold temperature, making their own food by photosynthesis. The red color protects them from the intensity of the sun on the snow.



Many organism have adaptations that defy our understanding of life. They therefore hypothesize that life may exist in the harsh environments on other planets.