

# Population Ecology

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Population is a group of organisms of same species that are able to interbreed and live in/on the same habitat for a particular period of time. However, community refers to all of the organisms interacting each other and living in the same habitat.

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Populations can be defined at various spatial scales. Local populations can occupy very small habitat patches like a puddle. Populations can be considered at a scale of regions, islands, continents or seas. Even the entire species can be viewed as a population.

Population ecology studies the dynamics of populations as they interact with their environment. The size of a population changes by adding or removing individuals. Births and immigrants add individuals to a population; Deaths and emmigrants remove individuals from populations.

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If population gain (births, immigration) is equal to the population loss (deaths, emigration), then population size will not change (Equilibrium).

If population gain is greater than loss, population size will increase.

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If population loss is greater than gain, population size will decrease.

**Population size** refers to the total number of individuals in the population. Population size influences the chances of a species surviving or going extinct. Generally, very small populations are at greatest risk of extinction. However, in some cases the size of a population may be less important than its density.

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In nature, it is usually not possible to get an exact number of total individuals in a population.

Population density only represents the average number of individuals per unit of area or volume. In most of the cases individuals in a population are not spread out evenly. Instead, they may live in clumps or some other patterns. The pattern may reflect characteristics of the species or its environment. Thus, **population distribution** describes how the individuals are distributed, or spread throughout their habitat.

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**Random distribution**, (=unpredictable spacing) is the least common form of distribution in nature. It occurs when the members of a given species are found in homogeneous environments in which the position of each individual is independent of the other individuals: they neither attract nor repel each other.

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In **uniform distribution**, organisms are spread out in a fairly regular pattern. In uniform distribution the distance between neighboring individuals is **maximized** which arises from Doç. Dr. M. Borge Ergönül **competition** for a resource such as moisture or nutrients, or as a result of direct **social interactions** between individuals, such as territoriality.



**Allelopathy** is the release of chemicals from plant parts by leaching, root exudation, volatilization and residue decomposition. Allelopathy can have beneficial, harmful, or neutral effects on surrounding organisms. For example, *Leucaena leucocephala* Doç. Dr. M. Borge Ergönül exudes a chemical that inhibits the growth of other plants but not those of its own species, and thus can affect the distribution of specific rival species. It has also a potential to suppress weeds which is being researched.

**Clumped distribution** is the most common form of population distribution among animals. In clumped distribution, the distance between neighboring individuals is minimized.

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- It may be due to local abundance of food or other resources which attracts individuals around that sources.

- **It can be temporary.**

Some animals form groups for mating (some sea stars) or for socialization (sea otters).

- **It can be due to social congregations**

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Many animals purposely form groups to enhance their survival. For example deer and buffalo form protective herds because it is much easier for predators attack a lone animal than a large group.

- **It could be related to territoriality.**

It has proven that groups of aggressive chimpanzees invade the territory of their neighbours in order to acquire more resources or mates. Gangs of chimpanzees carry out violent attacks on individuals from rival groups in order to secure more resources or mates.

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Ecologists usually use **estimates** based on different approaches to get average values. Such approaches are easy to use for plants, however due to their mobility, it is difficult to obtain estimates for animals. Animals behaviour, habitat selection and food preference are decisive for sampling and estimates.

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