Chapter 10

The Ecology of the Soil Biota and their Function

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GLOSSARY OF TERMS

Abiotic Factors	Elements that contribute to an organism's environment that do not originate from living organisms, such as rain, sun, etc. Compare to **biotic factors**.
Anthropogenic	Resulting from or caused by actions of human origin. A term often used to describe specific human impacts on nature.
Autochthonous	A term used by Winogradsky to describe organisms that grow steadily on resistant organic matter with a constant presence in the environment. Contrast with **zymogenous.**
Autotroph	An organism capable of producing its own organic molecules from inorganic substrates. For example, an organism that can use inorganic forms of carbon and obtain energy from oxidizing inorganic compounds and radiant energy sources. Contrast with **heterotroph.**
Biocontrol	The use of one species to control the population density of another species, such as introducing a natural enemy to reduce the size of a pest population.
Biodiversity	The types and densities of living organisms within a given area, biome, or planet. Includes diversity of genes, species, and ecosystems and the processes that link them.
Biogeography	The study of the distribution of organisms or the adaptations of organisms to their environments across an area through time. A systematic consideration of all the organisms that have existed in one area.
Biotic Factors	Elements that contribute to an organism's environment and originate from living organisms, such as competitors, predators, etc. Compare to **Abiotic Factors.**

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Carrying Capacity	The number of individuals that the resources of a habitat can sustainably support.
Community	A term to describe all of the species that coexist in one habitat.
Community structure	The numbers (density) and types (diversity) of organisms present in one area.
Competition	The interaction between two organisms that usually results in a reduction in the performance of both organisms through use of the same resources. In general, one organism will "win" the competition while the other will be eliminated from the system unless coexistence is achieved.
Competitive exclusion principle	The concept that two species with identical niches cannot coexist. The species with the advantage will dominate and the other will go extinct or over the long term shift its ecological niche.
Copiotrophs	Organisms that grow quickly at high nutrient levels.
Disturbance	An event that causes a decrease in the biomass or the sudden mortality of an otherwise competitively-dominant species or group of species.
Ecological drift	The result of broad types of processes that affect the distribution of microbial taxa, genotypes, and genes.
Ecology	The study of the interactions of organisms with each other and their environment.
Ecosystem	All interacting populations (biotic) and the environment (abiotic) within which they interact.
Ecosystem engineer	An organism that has widespread effects on the physical structure of an ecosystem that cannot be predicted based on its biomass alone.
Ecosystem function	Functions within the ecosystem that involve flux of genes, energy, or materials through the ecosystem.
Ecosystem stability	The ability of an ecosystem to withstand disturbance.
Emergent properties	Properties of a system that are not obvious from the study of processes at finer levels of organization.
Evolutionary drift	A change in the frequency of an allele in a population as a result of chance. Often a result of a sudden decrease in the size of a population. It is a process that can affect the distribution of microbial taxa, genotypes, and genes.
Exploitation	A type of trophic interaction wherein energy or nutrients are transferred from one organism (the prey) to another (the consumer).
Food web	The trophic (as related to energy) connections within an ecosystem. Each organism is connected within the web based on its relationship to the organisms from which it derives its energy.
Fugitive species	Species that can coexist with a superior competitor because it can avoid competition by dispersing into habitat patches where the dominant species has become locally extinct.

Functional redundancy	An ecological argument that suggests that there are so many species that have the same function, that loss of one will not alter the way the system operates.
Functional traits	Characteristics of a species that can be used to define its role in the ecosystem. Properties of an organism that affect how well the organism performs under a certain set of conditions
Fundamental niche	A description of the combination of all environmental conditions that are acceptable for the persistence of a population. Contrast with **Realized Niche.**
Generalist	An organism in a food web that consumes many different prey species. Contrast with **Specialist.**
Geographic contingency	When a specific event or the existence of an organism is dependent on the particular spatial arrangement of elements of a landscape.
Habitat matrix	A landscape comprised of a number of different habitat types often differing in age since disturbance.
Habitat	The area in which an organism lives.
Heterotroph	An organism that requires synthesized organic molecules as a source of energy and matter; for example, an organism that consumes other organisms or detrital matter.
Historical contingency	When a specific event or the existence of an organism is dependent on a particular series of events that occurred in the past.
Interference competition	Competition wherein one competing species impacts another through direct aggressive action rather than resource use.
Interspecific competition	Competition for resources between members of different species.
Intraspecific competition	Competition for resources between members of the same species.
Intrinsic growth rate of the population (r)	The value the population specific growth rate approaches when resources are not limiting growth and there is no intraspecific competition.
Landscape	The particular spatial arrangement of the environmental components important in some way to the population dynamics of a given species. The ecological definition does not link landscapes to a particular spatial scale, but to the spatial scales over which the organisms interact with the environment.
Life history	Lifetime patterns of growth and reproduction for a species, including timing of reproductive and dormant stages.
Lithotroph	Organisms capable of using inorganic materials, such as ammonium and some sulfur compounds, as energy sources.

Logistic growth equation	A mathematical model that describes the effect of intraspecific competition on the change in population size over time.
Metacommunity	A group of communities linked by dispersal across a landscape, resulting in emergent, regionally driven community dynamics.
Metagenomic approach	An approach to studying communities by analyzing the "metagenomes" recovered directly from environmental materials.
Modulators	Factors that affect the growth rate of organisms, but are not consumed in the process.
Mutualisms	Interspecific relationships that are beneficial to both organisms involved.
Mycorrhizae	The mutualistic relationship between a plant root and fungus wherein the plant acquires nutrients from the fungus and the fungus acquires food from the plant.
Net Primary Productivity (NPP)	The total energy uptake by plants in an ecosystem that is available for use by other trophic levels.
Oligotrophs	Organisms that grow only at low nutrient levels.
Parasitism	An interspecific exploitative relationship in which one organism lives off the living tissues of another organism.
Phylogeny	Branch of biology that deals with the evolutionary relationships of organisms.
Population dynamics	The study of the characteristics (size, age, distribution, etc.) of populations.
Population	A collection of all of the organisms belonging to a single species with potential for interaction.
Population specific growth rate (μ)	A term in the logistic growth equation that represents the probability of an individual reproducing minus the probability of death per unit time and equal to the overall amount by which a population grows or shrinks in that period.
r- and K-Selection Model	A conceptual tool that is used to generalize species' life histories. K-selected species (with high K values and low r values) have traits that favor the persistence of individuals under conditions of scarce resources and high intraspecific competition and r-selected species have the opposite characteristics with relatively high efficiency in converting resources to offspring.
Realized niche	The reduced niche hypervolume corresponding to the conditions that a species is actually able to occupy as a consequence of interactions with other organisms and environmental limitations. Contrast with **Fundamental Niche.**
Resilient	A system that changes, but returns, to its pre-disturbance state within a reasonable timeframe. A term often used to describe ecosystem stability.

Resistant	A system that does not change appreciably following a disturbance. A term often used to describe ecosystem stability.
Resource partitioning	A scenario in which similar species evolve to use different sub-types of the same resource to reduce competition.
Resource-based competition (exploitative competition)	A form of interspecific competition in which the stronger competitor consumes a finite pool of resources faster than a weaker competitor.
Specialist	In a food web, an organism that specializes in consuming one type or a few types of prey species. Contrast with **Generalist**.
Species concept	A concept that defines a species as an interbreeding group of organisms that is reproductively (and genetically) isolated from other organisms.
State factors	The state factors, climate, time, parent material, potential biota, and topography, set bounds on the types and rates of, and the raw materials available for, processing within an ecosystem. These factors were originally discussed as soil forming factors by Dokuchaev (Jenny, 1961).
Succession	The replacement of populations in a habitat through time due to ecological interactions, usually following disturbance.
Topography	The slope and aspect characteristics of an area that determine access to water, movement of materials, soil depth, degree of weathering of parent material, and total annual energy budget.
Trophic cascade	Occurs within ecosystems when a predator suppresses its prey in such a way that the prey is no longer controlling the population size of the next lower trophic level (the prey of the prey), thus dramatically increasing the population density of the lower trophic group.
Trophic levels	The position of a group of organisms within a food web (e.g., herbivores and carnivores).
Zymogenous	Term used by Winogradsky for organisms that proliferate on fresh organic matter. Contrast with **Autochthonous.**