
The Life Beneath Our Feet

A Discussion on Ecological Succession and Ecosystem Services

Generalists and Specialists

Soils are filled with microorganisms that are incredibly small but exist in vast numbers, allowing them to move easily and adapt to different environments. Microbes, like all other organisms, have different strategies for surviving change. Some are generalists while others are specialists:

Specialists thrive in specific conditions and have narrow ecological roles. They often rely on particular food sources or environmental factors.

Generalists are highly adaptable and can survive in a wide range of soil conditions. They play flexible roles in the ecosystem, consuming various food sources and adjusting to environmental changes.

Ecological Succession

Generalists, capable of thriving in a wide range of environmental conditions, often dominate in the early stages of succession, rapidly colonizing disturbed or new environments. As conditions stabilize, specialists (organisms adapted to specific niches) become more prominent, optimizing soil functions through intricate interactions within the ecosystem. This dynamic interplay between generalists and specialists ensures a continuous process of ecological succession, leading to the development of diverse and resilient soil ecosystems.

Ecosystem Services Provided by Soil Organisms

Ecosystem functions supported by micro- and macro-life in the soil include:

- Regulating Services
- Supporting Services
- Provisioning Services

Ecosystem Services: Regulation

- Climate regulation: sequesters carbon, stabilizes greenhouse gases.
- Water regulation and purification: filters pollutants, improves moisture retention.
- Disease and pest control: suppresses pathogens, limits invasive species.
- Decomposition and nutrient cycling: breaks down organic material, supporting nutrient cycling.

Ecosystem Services: Support

- Building and stabilizing soil: contributes to soil structure, improving stability and resistance to erosion.
- Nutrient cycling: breaks down dead plant material and releases nutrients in a form that plants can absorb.
- Water cycling: affects how soil absorbs and retains water, influencing both local and global water cycles.
- Supporting plant growth: enhances soil health, promotes root development, and improves nutrient availability for plants.
- Maintaining biodiversity: helps sustain a diverse soil ecosystem, supporting plant and microbial interactions.

Ecosystem Services: Provisioning

- Production of crops: maintains soil conditions that support the growth of plants for food, fiber, and other agricultural uses.
- Bioremediation agents: contribute to soil detoxification and restoration by breaking down pollutants and improving soil health.

Thank you for reading!

This information was adapted from Sacca et al. 2017.