



*Supporting Services – Soil
Formation And Maintenance
Part 1*

Soil formation

As soils form, mature and age, they pass through a number of different stages, each of which is associated with specific species composition and structure in soil communities and plants. Soil biodiversity actively contributes to the transition from one stage to another, thus contributing to the formation of soils as one of the main factors that supports habitats for itself and other living creatures.

Stage 1

In Stage 1, bedrock is exposed and weathering begins. Living communities are essentially comprised of microorganisms that form bacterial and algal crusts and other structures, with a progressive development of a food web mainly comprised of invertebrate microfauna: protists, nematodes, rotifers, plus a few mesofaunal components: collembolans and mites. Stage 1 is observed, for example, in the years following volcanic deposition or the recent exposure of rocks after glacial retreat due to melting. Depending on climatic conditions, this stage may only last from a few years to decades or persist for undefined periods of time.

Plants then appear, at first in the form of mosses and ferns, plus a number of pioneer plants. Accumulation of organic matter from their dead materials allows for the development of a first horizon, which is a mixture of fine-textured mineral elements and organic matter. While organic matter produced in these ecosystems is often of a rather low quality, it tends to accumulate on the soil surface, forming increasingly thick accumulations in which a wide diversity of arthropoda, such as hexapods, myriapods and other invertebrates of the litter transformer group build remarkably large and diverse communities.

Stage 2

In Stage 2, deeper soils allow for the development of bushes and trees. The weathering of the bedrock is accelerated by the direct effects of roots, or indirectly by the effects of different substances issuing from the decomposing leaf litter. Lixiviation of organic acids from decomposing litter triggers the migration of clay minerals to the bottom of the profile where they form a B horizon, causing an eluviated E horizon to appear.

Vegetation is often dominated by coniferous trees and litter accumulates that form a very active litter system in which fungi, collembolans, mites and enchytraeids are abundant. These soil organisms are litter transformers and play a vital role in the decomposition and humification of all types of plant and animal remains. Soil in the A horizon is often acidic, which may limit the activity of ecosystem engineers, especially earthworms.

Stage 3

Stage 3 marks the full maturity of the soil system as vegetation reaches full development and soil communities reach their maximum levels of activity and diversity. Plant communities have become fully established, and deciduous trees produce increasingly high-quality organic materials that stimulate biological activity in the soil.

To be continued...

Soil Lovers say: Essential Soil Succession Knowledge

Ref: A Global Atlas of Soil Biodiversity p110

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