



*Supporting Services – Soil
Formation And Maintenance
Part 3*

Soil maintenance

Other ecosystem services provided by soils and their biota increase and are maintained as the ecosystem functions that they sustain gain in intensity. As described previously, it is possible to identify four stages in the evolution of soils, corresponding to the vertical arrangement of layers in a soil profile. Because of their immaturity, developing soils do not provide significant contributions to soil system services. However, young soils are important for supporting plant growth since roots mainly develop in this layer. Mature soils may allow large amounts of water to infiltrate and to be retained in their pore spaces at different matric potentials, thus optimising supply to plants and, ultimately, allowing water to feed springs and rivers. Older soils play a key role in the control of the hydrological cycle thanks to their greater depth, where water tends to accumulate.

Forces due to folding and faulting of the Earth's crust (orogenic processes) and erosion continuously bring new bedrock elements to the surface, and new soils are formed while old, highly impoverished soils are slowly disaggregated by erosion, reincorporated into the deep soil cortex by continental plate movements or buried below fresh volcanic deposits. As soon as they emerge above sea level, sediments and rocks start to be weathered by physical and chemical processes, and colonised by increasingly diverse organisms. Coexisting organisms progressively increase in their interactions as new species appear and biodiversity increases.

Coevolution for several hundred million years has led to the emergence of mutualistic interactions between micro- (e.g. fungi) and macroorganisms (e.g. plants) that enabled them adapt to two major constraints in soils: the difficulty to move and to find food in a very compact environment and the relatively low quality of the organic materials that comprise the majority of the available food sources. These relationships are crucial to maintaining the proper functioning of soils.

In conclusion, soil-living organisms have two major effects on and functions in soil formation and maintenance:

- a. as active agents in soil formation, maintenance, organisation and dynamics through intense mechanical effects (bioturbation, burrowing, chemical transformation, transport and mixing of organic and inorganic elements)
- b. as a source of organic matter through excreta, as prey and when dead. Organic matter has three major functions: 1) as an energy source for living organisms; 2) as a reactive building material of soil structure acting as a frame or glue in the formation of stable aggregates; 3) as a sizeable stock of carbon subtracted from the atmosphere (thereby also participating in climate regulation)

These two effects allow soils to be maintained in terms of both structure and fertility, thus resulting in the provision of other ecosystem services.

Soil Lovers say: Essential Soil Succession Knowledge

Ref: A Global Atlas of Soil Biodiversity p110