

Brown George, Lavelle Patrick, Jackson Louise, Brussaard Lijbert

Unearthing below-ground biodiversity: Management and conservation implications

Embrapa Florestas, Ecology, Brazil, browng@cnpf.embrapa.br

Plenary session

Soils are living entities and the home of a vast diversity of organisms, with a broad range of body sizes (from bacteria to earthworms), feeding strategies, and life habits. The great spatial and temporal variability in soils promotes a complex niche structure and an incredibly dense packing of species: a typical healthy soil may have a few species of vertebrates, springtails and oligochaetes, dozens of species of nematodes, spiders, mites and myriapods, more than one hundred species of insects and fungi and perhaps thousands of species of bacteria and actinomycetes. This may be the case even when the diversity of above-ground species is much lower, e.g., in agroecosystems. This myriad of animal and microbial community provides a range of essential functions and ecosystem services, including: biocontrol of pests, parasites and diseases; decomposition; nutrient cycling; carbon sequestration; soil formation; alteration of physical properties (especially porosity and aggregation), that affect soil stability, erodibility, gas exchanges, C sequestration, water runoff, infiltration and storage capacity; sources of food for indigenous human societies; plant pollination; plant growth control (both positive and/or negative). Nevertheless, this vital and dynamic subterranean ecosystem is often unrecognized, little understood and therefore mismanaged. Human decisions regarding landscape use and management play a crucial role in the determination of several factors important to the maintenance of active and beneficial soil communities. For instance, the conversion of natural habitats and the intensification of agriculture represent major threats to soil biodiversity and soil quality, but with appropriate landscape and farm management practices, negative effects can be abated and positive synergies can be promoted. Several international projects and initiatives are presently studying these issues, and the challenges involved and the progress obtained thus far will be explored.

Keywords: soils, biodiversity, agricultural sustainability, landscape, ecosystem services