



## Soil Biodiversity And Ecoregions – Temperate Broadleaf And Mixed Forest

### **Moderate, woody and rich in litter**

Temperate forests occur in areas with distinct warm and cool seasons, which give them a moderate annual average temperature (3 to 16 °C). About 570 million hectares are covered by temperate forests, making it one of the major ecoregions on Earth. This biome plays a crucial role in the global carbon budget. In this ecosystem, carbon (C) enters the soil in the form of plant litter through the below ground allocation of C that has been fixed by plant photosynthesis, and as dead fungal and animal material. As a consequence of the input of new litter (leaves, dead wood) and its transformation, it is possible to recognise three distinct layers in the soil profile:

- the litter (L horizon), composed of organic matter derived, almost exclusively, from dead plant biomass
- the organic (or humic) H horizon: representing a mixture of processed plant-derived organic matter and soil components
- the mineral soil horizon: originating both from the decomposition of organic matter and exudation from the abundant tree roots.

Compared to other ecosystems, forest specificity lies in the presence of dead wood material. Dead wood represents between 10 and 20% of plant biomass in these forests. Moreover, it has been estimated that dead wood material comprises about 18 % of the carbon stock in temperate forests. The great presence of woody material influences the communities of soil organisms.

### **Soil biodiversity**

Soil biodiversity in temperate forests shows a high abundance of decomposers. The diverse assemblage of arthropods associated with dead wood are known to accelerate decomposition. Various processes could take place during the whole process (e.g. consuming and excavating wood, hastening wood fragmentation through mechanical weakening, and facilitating fungal colonisation through tunnelling). The relative importance of each process varies greatly depending on wood traits, faunal composition and abiotic conditions (e.g. temperature, humidity, resource quality, etc.). By contrast, termites are concentrated in warmer regions, and beetles associated with dead and dying wood are distributed much more widely. During the decomposition process, changes in wood characteristics impact the total abundance of millipedes and isopods, with their number increasing as wood density decreases.

In temperate forests, the soil community also includes microorganisms. Fungi, particularly the basidiomycetes, are the main microorganisms responsible for wood decomposition because of their ability to degrade recalcitrant ligno-cellulose complexes. Fungi that help wood decay can be broadly categorised into primary, secondary and end-stage colonisers:

- primary colonisers are present as spores in the standing trees. They proliferate through the uncolonised wood, utilising easily accessible nutrient sources and then more recalcitrant compounds
- secondary colonisers are present as spores, but also arrive as mycelium that has grown out of colonised resources looking for new substrates
- end-stage fungi proliferate as they can tolerate certain environmental stresses; they are not able to compete for substrates used by primary and secondary colonisers.

***Soil Lovers says: Consider The Benefit Of Decomposition Of A Variety Of Trees  
Planted Higher In The Landscape***