GOLD NUGGET

Regulating Services – Water Supply And Quality

Water supply

The safeguarding of soil hydrological services relies strongly on the activity of soil biota. Their role in maintaining soil structure, has both direct and indirect implications for water supply and water quality regulation. In particular, those organisms contributing to the formation of macropores and tunnels have a direct effect on water, air and nutrient movement through soil profiles. They include all the burrowing soil creatures, such as earthworms, dung beetles, social insects and their larvae, as well as some vertebrate groups, such as moles, rabbits, foxes and badgers.

Some numbers may explain the ability of soil organisms to dig soil. For example, some earthworm species in Tasmania dig burrows with diameters that range from < 1 mm to > 10 mm, and depths of up to 15 m. Furthermore, it has been conservatively estimated that earthworms can dig about 17 - 40 tonnes of soil per hectare per year. Just one tropical species, Eudrilus eugeniae (the 'African Night Crawler'), produces around 157 tonnes per hectare of surface casts per year.

With regard to ants, there is a general trend of increasing subterranean tunnel networks with increasing colony size. For example, one of the largest colonies ever found was in Japan, containing over 300 million worker ants and one million queens living in 45,000 nests interconnected by underground passages over an area of 2.7 km.

The European mole (Talpa europea) continuously searches for food, running through its network of tunnels, which can often reach lengths of over 70 m and can vary in depth from just under the surface to up to 70 cm deep. The Zambian mole-rat (Fukomys amatus) digs some of the longest tunnels in the natural world. A single underground colony, containing just ten mole-rats, can stretch for 2.8 kilometres. Another great digger is the badger. Its tunnels can have a combined length of several hundred metres, although individual tunnels rarely exceed 15 metres in length. All these numbers clearly show the positive impact of soil-living organisms on water circulation in the soil.

Water quality

Soil detoxification and water 'filtration' are essential for maintaining the quality of soil and, consequently, that of our surface and groundwater resources. Soil water purification is carried out abiotically (e.g. interactions with organic and inorganic soil particles) and biotically (through adhesion, binding and adsorption onto microbial cells and soil organisms), with any potential soil contaminants also being subjected to dispersal through bioturbation and burrowing activities. In addition to these physical processes, biotransformation and degradation of xenobiotic compounds and contaminants (e.g. metals, pesticides and solvents) within the soil also take place in natural environments, carried out mainly by native heterotrophic (i.e. carbon-eating) soil bacteria (e.g. genus Pseudomonas, Micrococcus, Streptomyces, Corynebacterium and Thiobacillus) and most wood-degrading fungi (e.g. white-rots, such as Phanerochaete chrysosporium and Trametes versicolour).

Soil Lovers say: ***Only A Healthy, Living Soil Will Ensure Water Quality And Supply***

Ref: **A Global Atlas of Soil Biodiversity p107**