



Erosion in living soil and life in eroded soil

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The relationship between erosion and biodiversity is reciprocal. Soil organisms can both reduce soil loss, by improving porosity, and increase it, by diminishing soil stability as a result of their mixing activities. Simultaneously, soil runoff has ecological impacts on belowground communities. Despite these obvious interactions, soil erosion models do not consider biodiversity in their estimates and soil ecology has poorly investigated the effects of erosion. In order to start filling in these knowledge gaps, a novel biological factor was developed and introduced, for the first time, into a well-known soil erosion model (the revised universal soil loss equation, RUSLE). Furthermore, insights to advance soil erosion ecology were proposed.

Thanks to available data on both soil erosion (Panagos et al., 2015) and earthworm diversity (Rutgers et al., 2016), an “earthworm factor” was generated and applied to produce the first maps of a modified soil erodibility. The incorporation of “earthworm factor” reduces soil erodibility and as a consequence soil erosion. On the other hand, also the erosive events affect the soil-living communities. Potential consequences of soil erosion on soil life were also identified: migration, invasion, violence, defence, rebuilding and functional effects were described.

The results showed how new estimates of soil loss can be produced by adding biological factors to soil erosion models. The earthworm factor represents the first step towards the inclusion of a wider biological factor, which takes into account the whole soil-living community, into erosion modelling. Fostering the development of soil erosion ecology for better understanding the reciprocal effects of erosion on soil life, will contribute towards this achievement.

The increasing availability of large-scale data on soil biodiversity distribution opens up the possibility of incorporating a biological component into bio-physical models such as the soil erosion one. The model integration between the soil ecologists and soil erosion modellers is key point for identifying the interactions between soil organisms and soil loss.

References

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