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## **Biotic interactions and soil-based ecosystem services in complex landscapes**

The recent emphasis on Ecosystem Services (ES) as a key for the sustainable management of ecosystems has drawn attention to the ways in which different organisms contribute to the delivery of ES. Understanding dynamic interplay within soil biota is mandatory to recognize stable ecosystems and therefore to identify ES. Hence, there is an urgent need to develop new concepts for quantification, assessment, management and planning of ES.

The main objective of this project is to understand the mechanisms underlying ES. With this aim, the main processes underpinning ES in the soil will be explored and functional traits that influence ecosystem functioning will be identified. We shall analyze which components of functional diversity influence ecosystem functioning and how functional diversity itself changes. The general hypothesis is that a displacement from the dynamic equilibrium of a given system will affect soil processes beyond the original range of values ('Normal Operating Range') and will lead to change(s) in the quality and quantity of ecosystem services. The assumption is that the response of a certain ES to environmental pressure results from the responses of each trophic level to this pressure through biotic interactions with adjacent trophic levels. Then, functional responses and effects within and across adjacent trophic levels can be articulated in a framework to forecast ecosystem functioning. In this way, the relationships between soil attributes and soil processes linked to ES can be investigated. Allometric scaling will be used to test the trophic response(s) under different pressure/treatment. Structural equation model (SEM) will be applied to test the hypothesized relationships between soil processes, ecosystem functioning and ES. Once a plausible model has been identified, the functioning of the ecosystem can be investigated by examining the strength and direction of the modeled relationships among the variables.