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Functional Ecology as a Tool for Predicting Ecosystem Responses to Climate Change

Friday 10 October 2025 15:36 (12 minutes)

Ecosystems influence global climate and can lead to an acceleration or deceleration of climate change. As climate change continues almost unregulated, reliable predictions about the feedback of ecosystems to global changes are becoming increasingly urgent. At the same time, however, we still have difficulty simplifying the complexity and diversity of ecosystems in such a way that the information can be reliably reflected in calculated predictions. In functional ecology, we categorize the role of species in ecosystems based on the relationship between functional characteristics and ecosystem processes, thus enabling the use of categorized information in models. In my Heisenberg research project, I focus on the mycorrhizal symbiosis between tree roots and fungi as possible functional grouping of tree flora. Most tree species are associated with either arbuscular mycorrhizal fungi or ectomycorrhizal fungi, which supply their hosts with mineral nutrients in exchange for carbon. Since the two types of mycorrhiza differ fundamentally in their nutrient balance, mycorrhizal type represents a possible grouping that is relevant for the carbon cycle and nutrient binding in forests. In my presentation, I will (i) derive the significance of the mycorrhizal type as functional grouping for understanding biogeochemical cycles in forests under climate change, (ii) present some findings on the influence of mycorrhization on biodiversity effects in temperate and tropical forests, and (iii) discuss open knowledge gaps on biotic interactions and their role in ecosystem-climate feedbacks.

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