

The role of forest biodiversity for human health benefits and risks

**Prof. Dr. Michael Scherer-Lorenzen
& the Dr.Forest consortium**

Freiburg University

Forest risks and benefits to human health are widely recognised. Yet, the role of forest characteristics – such as tree species diversity or canopy density – driving health effects remains underexplored. Based on data from a European forest network (Dr.Forest), we quantified causal pathways relating different forest types to physical and mental health. Specifically, we determined i) mental wellbeing via visual cues, ii) via auditory cues, iii) thermal comfort, iv) polyphenol content of medicinal plants, v) nutritive qualities of mushrooms, vi) air quality and vii) ticks and Lyme disease.

Results show that forests generate net health benefits regardless of their ecological characteristics, except for the high tick prevalence compared to other ecosystems. Canopy density and tree species diversity emerge as key drivers, but their effect size and directionality are strongly pathway dependent. Changes in canopy density can generate trade-offs, e.g. forests optimised for heat buffering may enhance Lyme disease prevalence. Tree diversity effects were weaker but more consistently positive.

Forest management may enhance health benefits and mitigate risks. Even when modulation effects are small, this can translate to considerable impact at the public health level. Importantly, management should account for trade-offs to tailor forest biodiversity and functioning to local public health needs of priority.

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Prof. J. Kollmann (Tel. 08161-714144, johannes.kollmann@tum.de)