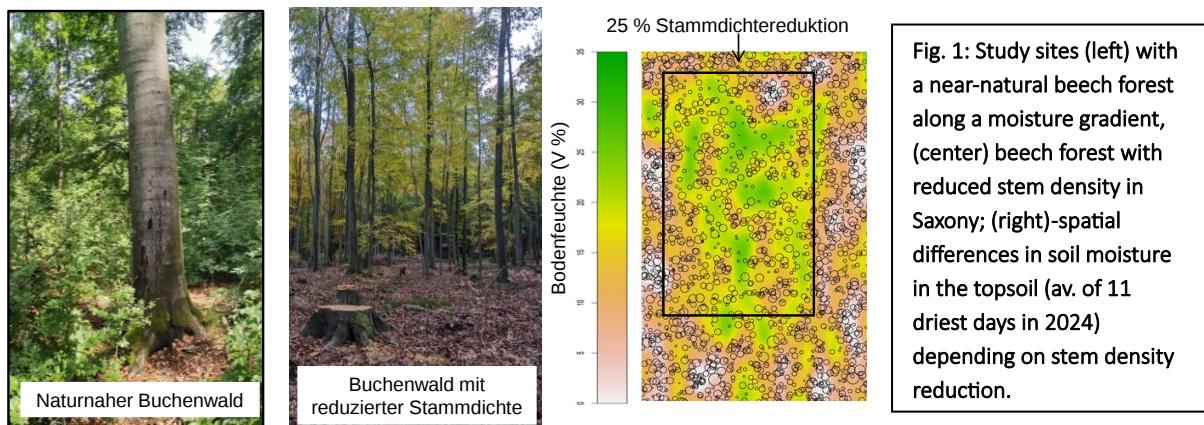


The Institute of Soil Science and Site Ecology, **Chair of Forest Sites and Hydrology (Prof. Natalie Orlowski)** and **Chair of Soil Resources and Land Use (Prof. Karsten Kalbitz)** at the TU Dresden are looking for **three doctoral candidates** for the following projects **starting in spring 2026**:

1. Project „Forests in transition: The future of European beech under drought stress“ (funding: Eva Mayr-Stihl foundation; Prof. Orlowski)



The aim of the overall project (collaboration with 6 Chairs at TUD) is to quantify the influence of stem density reduction (i.e., varying degrees and forms of forest thinning) on the water supply and associated biomass development and vitality, as well as carbon storage in beech stands across Saxony, Germany. This will be achieved through a novel combination of different cross-scale monitoring approaches, which will enable an improved understanding of the causes and consequences of varying water availability to individual beech trees, as well as upscaling to larger areas and model-based predictions for the future. The core of the approach is to combine the assessment of the crown water status of trees with water transport and stem water status in the trees, water availability in the soil, and root activity in terms of water uptake and carbon storage.

Subproject (Chair of Forest Sites and Hydrology): “Water movement along the soil-plant-atmosphere continuum”

The subproject at the Chair of Forest Sites and Hydrology will determine the influence of stem density reduction on soil water availability, the origin and residence times of water in the soil-tree system at different European beech stands across Saxony, Germany.

The subproject is embedded in a consortium of six other professorships at TU Dresden.

The PhD will:

- Install throughfall collectors on beech forest sites in Saxony, Germany
- Evaluate data on soil water balance and quantify soil water flows and dynamics
- Install a water isotopic monitoring platform

This document contains preliminary information. The official job adverts will follow and can be found here: <https://tu-dresden.de/tu-dresden/arbeiten-an-der-tud/stellenangebote>

- Conduct a water isotope-based characterization of soil water flow paths and tree water uptake strategies under varying site conditions (e.g., exposition, thinning)
- Determine the origin of water sources in trees, estimate water residence times and water availability
- Setup an isotope-based ecohydrological modeling framework for water uptake strategies by European beech.

We offer an interdisciplinary team and international network, flexible working hours, the opportunity to publish and present your work at national and international conferences.

Start: spring 2026, **duration:** 3.5 years, **65 % position E13**

2. Project: „DeMoLD: Nexus of Deadwood Moisture, Lignin Degradation and Matter Transport in Changing Forest Ecosystems“ (funding: DFG; jointly: Profs. Orlowski & Kalbitz)

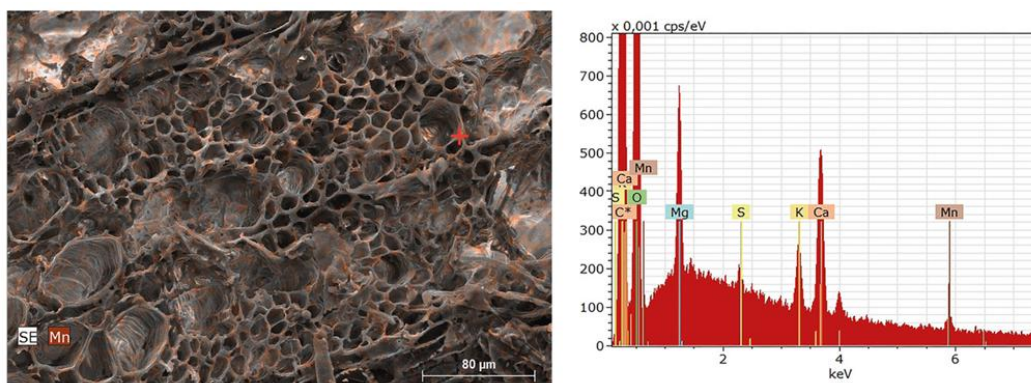


Fig. 2: Scanning electron microscope image of beech deadwood combined with energy dispersive X-ray spectroscopy showing the enrichment of Mn at the cell walls (left) and the complete spectrum (right) at one sampling point (red cross).

Deadwood is vital for forest biodiversity and carbon cycling — but its moisture dynamics under changing climate remain poorly understood. This PhD project investigates how fungi influence **deadwood moisture** through lignin degradation and how these processes affect the exchange of water, elements, and carbon between wood and soil.

The PhD candidate will:

- Quantify the sources of deadwood moisture (soil water, precipitation, oxidation water) using water stable isotope, spectroscopy, and microscopy methods
- Analyze enrichment and spatial distribution of Mn, Fe, and other elements in deadwood
- Study how deadwood-derived carbon is stabilized in soils under different land-use and climate conditions.

This document contains preliminary information. The official job adverts will follow and can be found here: <https://tu-dresden.de/tu-dresden/arbeiten-an-der-tud/stellenangebote>

This work is conducted within the framework of the DFG funded “**Biodiversity Exploratories**” (<https://www.biodiversity-exploratories.de/en/>). The PhD will work in a collaborative, interdisciplinary team including the wider DFG Priority Programme group of the “Biodiversity Exploratories” (SPP 1374), the Institute of Soil Science and Site Ecology and the University Freiburg (Chair of Soil Ecology and Chair of Forest Pathology) using **cutting-edge methods** (water stable isotopes, spectroscopy, microscopy) across interdisciplinary field and lab experiments. The position offers joint laboratory work, interdisciplinary training, and opportunities to present and publish your results within an international research network.

Start: spring 2026, **duration:** 3 years, **65 % position E13**

3. Project „Forest water balance under stress“ (funding: TU Dresden; Prof. Orlowski)

Global forests are increasingly affected by extreme weather with drought being one of the most critical stressors. Particularly, in the last decade, **long-term and repeated droughts** are causing critically dry soil conditions in the global forests, leading to large-scale canopy dieback and tree mortality. **Shift of tree water uptake** to deeper, moister soil layers has been recognized as a key strategy for trees to cope with soil moisture drought. Beyond water uptake, internal water storage within the stem may play an important role in maintaining transpiration and hydraulic function, especially when external water availability becomes insufficient to satisfy the canopy water demand.

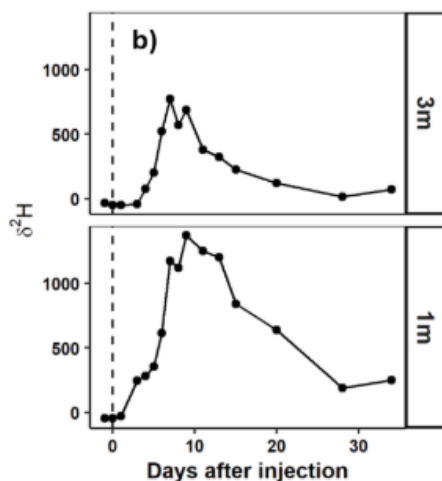


Fig. 3: Example of the breakthrough curves of collected water vapour ^2H values [%] over time at 1 m and 3 m above the deuterated water injection point into a beech tree

The aim of this PhD project is to **explore water availability and distribution** within different forest stands in Saxony, Germany. The PhD will employ water stable isotope techniques (Fig. 3) in combination with plant physiological, soil physical and hydraulic measurements to **determine trees' reaction to soil moisture droughts**.

This work is further embedded in the research context of **Project 1**. We offer an interdisciplinary team and international network, flexible working hours, the opportunity to publish and present your work at national and international conferences.

Start: spring 2026, **duration:** 3 years, **50 % position E13**

If you are interested in or have any questions about the advertised positions, please contact Prof. Orlowski (natalie.orlowski@tu-dresden.de).

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