Tree monitoring as tool in urban transformation towards Blue-Green infrastructure

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INTRODUCTION

Cities are facing growing challenges due to increasing heat waves and droughts as a result of climate change.

New, climate-smart approaches are needed to make them sustainable and liveable for people and nature.

Urban trees play a central role in this: they cool sealed surfaces, improve the microclimate and contribute to the resilience of urban spaces.

As part of the Urban Transformation Towards Blue-Green Infrastructure (UT-UBGI) and Cool Tree projects, we are investigating the vitality and cooling capacity of urban trees at locations in Leipzig (UFZ Campus) and Karlsruhe (KIT Campus South).

Methods

We will conduct various field measurements on a total number of 45 trees of three tree species:

Platanus x hispanica, *Robinia pseudoacacia* and *Tilia cordata*.

We are recording water flow, growth, microclimate and the effect of different irrigation strategies on *Robinia* and *Tilia* trees.

Additionally, we monitor tree health and physiology, such as canopy and fine root morphology for all of the selected trees.

The aim is to evaluate the potential of targeted irrigation for the health and cooling performance, as well as the current condition of established urban trees.

The measurement period will be from the spring of 2025 to the fall of 2026. We expect first results in beginning of 2026.

Monitoring levels

Canopy

- Relative humidity
- Temperature
- Foliage
- Canopy structure
- Leaf area index

Tree trunk

- Continuous sapflow
- Tree growth
- Distance to neighbouring trees
- Distance to buildings/streets

Ground

- Vegetation assessment of tree plate
- Fine root observation (18 trees)
- Availability of water (soil water potential sensors)
- Soil analysis (one time sampling)

Illustration: Katrin Fröhlich

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