



Bavarian Forest Ecosystem Monitoring Plots

Forests have exceptional importance for the functionality of the natural environment and for the protection of natural resources. They are subject to constant change controlled by environmental factors. At the Bavarian forest ecosystem monitoring plots (WKS) environmental impacts and their effects on forests are continuously measured in different landscapes and forest regions.

The Bavarian State Institute of Forestry (LWF) has been operating the Bavarian forest monitoring programme since 1991. The network provides basic data and infrastructure to other research initiatives.



Forest monitoring plots

- basic programme
- meteorological measurements only
- core plots
- co-funded by LIFE+(EU)

Cover photo: Lehmann

The Monitoring Programme

Basic parameters measured at all plots

- Meteorology (e.g. temperature, precipitation)
- Deposition of air pollutants and nutrients
- Soil condition
- Soil solution chemistry
- Contaminant leaching below the root area
- Tree growth
- Crown condition
- Phenology (e.g. time of bud break)
- Tree nutritional status
- Ground vegetation

Special parameters measured at core plots

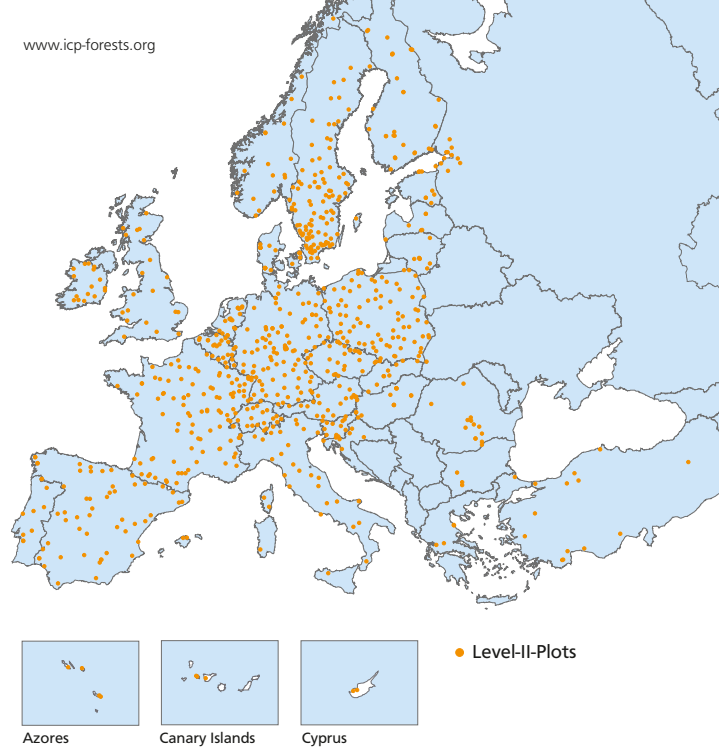
- Soil moisture and temperature
- Stand precipitation (throughfall, stemflow)
- Phenological garden
- Air pollutants (passive sampling)
- CO₂ emission from forest soils

The most important results are published in the Bavarian Forest Condition Reports to make them accessible for policy makers, but also for science and forestry service. Up-to-date data and information are available from the Bavarian State Institute of Forestry (LWF).

The new »FutMon« project aims to further develop European forest monitoring and is co-funded by the EU in the framework of the LIFE+ (FutMon) programme. A total of 38 partners from 24 countries are involved in this project. LWF participates with ten Bavarian forest monitoring plots.

»FutMon« provides qualified and comparable information on environmental risks and impact of climate change for European forests. This creates a supranational platform available to policy makers and the public.

www.icp-forests.org



Environmental Monitoring in European Forests

Bavarian forest ecosystem monitoring plots are part of a Pan-European network of intensive forest monitoring (EU/ICP Forests Programme Level II) for long-term assessment of environmental risks (atmospheric pollution, climate conditions) on the condition and the development of European forest ecosystems. The monitoring network, reaching from the North Cape to the Canary Islands, comprises almost 800 »Level II« plots of a total of 26 EU-member states and 15 non-EU countries.

The »Level II« plots are coordinated by the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests).

A Closer Look at a Bavarian Forest Monitoring Plot

Forest Stand Subplot

A forest stand subplot is located within a stand, which is as homogeneous as possible with regards to tree species, age, structure and site. Contaminants are quantitatively and qualitatively measured. Changes in the forest soil (such as soil acidity or summer drought) are monitored to evaluate their implications for forest trees.

Clearing Subplot

Open-field measurements are made on larger clearings nearby to the stand subplot. Monitoring includes data on meteorological key quantities having an impact on the forest canopy (such as wind speed), as well as dry or wet deposition of contaminants. Due to spatial proximity, comparable altitude and terrain data from forest stand and clearing subplots can be closely linked to each other.

The large amount of data collected (approx. 750.000 measurement values per year) allows identifying cause-effect relationships of environmental impact factors, such as storms, droughts and contaminants. Data are used, for example, for determining the date of bark beetle swarming. The monitoring is basically operated by the local forest authority.

The local forest officer takes a throughfall sample for laboratory analysis of nitrogen deposition.



Photo: Lehmann



Topographic data: Bavarian Surveying Administration, scale 1:162.000

- Forest stand subplot
- Clearing subplot

Ecosystem Monitoring Plot Freising

The Freising monitoring plot is located at the Kranzberg Forest between Kranzberg and Freising. It is located about 5 km western of the LWF.

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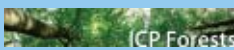
www.aelf-ed.bayern.de

Partner

**Bavaria State Forest Enterprise
forest holding Freising**
www.baysf.de



ICP Forests
www.icp-forests.org



FutMon
www.futmon.org



Ecosystem Monitoring Plot Freising

Location

Growth district »Oberbayerisches Tertiärhügelland«; bordering on the Münchner Schotterebene; 508 metres above sea level

Climate

Suboceanic to subcontinental; annual mean air temperature: 8,3 °C, annual mean precipitation: 844 l/m² (1998–2009); mean growing season approx. 164 days > 10 °C daily mean air temperature

Geology

Upper Marine Molasse (5–18 million year old sandy-clayey sediments), overlaying interglacial loess layer; effects of solifluction are found on most slopes

Soil

Haplic luvisol (WRB); high nutrient availability to plants; good soil water storage (about 200 liter plant available water per m² soil)

Stand characteristics

Approx. 150-year old beech-oak mixed forest; timber stock approx. 704 cubic metres per hectare with 65,9% beech and 34,1% oak (in 2009); average annual volume increment ca. 16 cubic metres per hectare (1995–2009)

Vegetation

Potential natural vegetation: woodruff beech forest (*Galio odorati-Fagetum*) of the colline-submontane zone; characteristics of ground vegetation: woodruff (*Galium odoratum*), wood millet (*Milium effusum*), wood sedge (*Carex sylvatica*)

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The Level II plot Freising belongs to the most productive forest sites in Bavaria. Beech trees are growing in its optimum and oak trees are strongly dominated. This Level II plot has an experimental attitude and enjoys high attention.



Freising

Special features

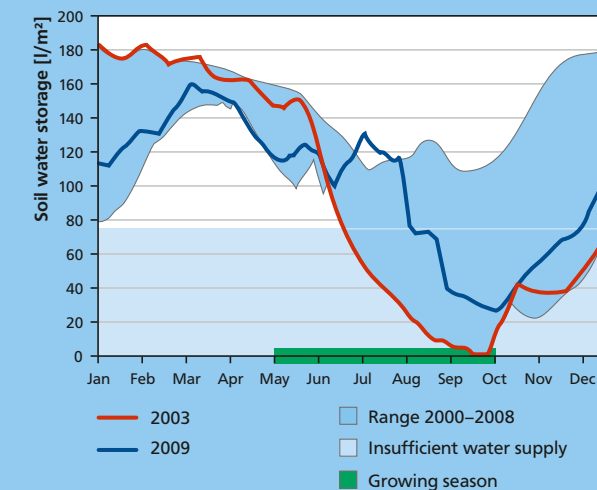
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The mixed beech tree stand possesses a high growth rate. The mean annual volume increment is about 16 cubic meters per hectare.



Photo: A. Kanold

Plant available water storage



2

The available soil water capacity is fairly high. However, during the »summer's drought of 2003«, the water storage in the soil became almost depleted and trees suffered from drought stress.

Annual volume increment

