Project *brief*

Thünen Institute of Forest Ecosystems 2025/13a

Establishment of a living lab for transdisciplinary forest research and long-term monitoring in the Brandenburg-Berlin region

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- **Establishment of a first intensive research site in Scots pine-dominated stands in north-eastern Brandenburg as part of a new living lab for transdisciplinary forest research**
- **Further development of the BWinPro forest growth simulator using laser scanning (LiDAR) and field inventory data**
- **We invite stakeholders to participate in the future development of the research site and welcome scientists and students to use it for their own studies.**

Background and aims

The joint project 'ADAPT-Wald-Holz' is one of ten regional REGULUS innovation groups for a climate-friendly forestry and timber industry funded by the Federal Ministry of Education and Research (BMBF) as part of the Research for Sustainability (FONA) strategy. The overall objective is to establish a regional network for adaptive forest resource management for a sustainable timber industry in the Brandenburg-Berlin region. The project is divided into three modules: forest management, wood supply, and wood utilization (Fig 1).

Figure 1: Overview of the major research topics in the transdisciplinary project ADAPT-Wald-Holz (Source: own presentation)

Materials and methods

In Module A 'Forest Management', the Thünen Institute of Forest Ecosystems collaborates closely with the State Forestry Research Centre Eberswalde (LFE) to establish a living lab in Scots pine-dominated forests within the Brandenburg-Berlin region. The main objective of this module is to investigate the influence of different forest management strategies on key ecosystem services, including wood production, carbon sequestration, water regulation, and biodiversity.
We have established an initial 27-hectare intensive research site in Kienhorst in 2023 as part of a long-term research infrastructure that will enable interdisciplinary research and involve multiple stakeholders and additional satellite areas in the future (Fig. 2).

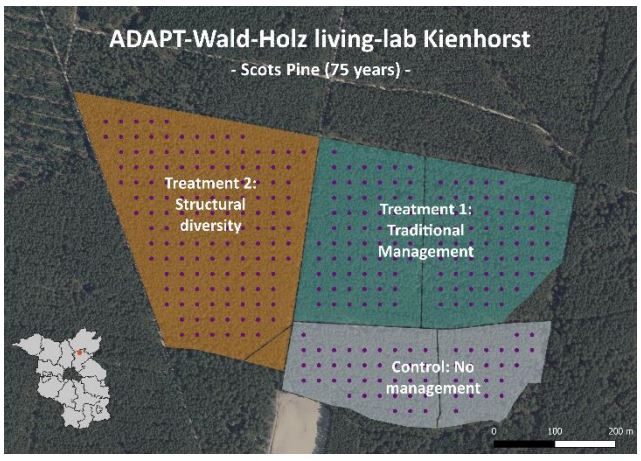

Figure 2: Plot grid at Kienhorst intensive research site (Source: Julia Kaplick, LFE).

The intensive research site is located near Joachimsthal in the Schorfheide-Chorin Biosphere Reserve in northeastern Brandenburg. It is a moss-rich acidophilous Scots pine forest on Albic Podzol with eolian sands and an average annual precipitation of 585 mm. The overstory consists of 75 year old Scots pine (*Pinus sylvestris* L.) and the understory of Scots pine, silver birch (*Betula pendula* L.), and sessile oak (*Quercus petraea* (MATT.) LIEBL.) irregularly distributed over the site.

The Kienhorst intensive research site is divided into three subsites with different overstory treatments that were first applied in the fall of 2023. The 'traditional management' site is thinned around every seven years and according to current practice in Brandenburg state forests. The treatment for 'increasing structural diversity' increases the amount of deadwood as well as the abundance and diversity of natural regeneration by creating canopy gaps and reducing competition from overstory trees. The 'no treatment/control' site is no longer actively managed.

Within a 25 m grid resulting in 327 permanently marked plots, we equipped 30 plots with automatic point dendrometers for measuring tree growth, precipitation and litterfall collectors, and sensors for soil and ambient air moisture and temperature (Fig. 3). Additional data on understory vegetation, including natural regeneration, deadwood, light availability, tree vitality, and biodiversity of vertebrates, invertebrates and fungi from tree microhabitat substrate for eDNA metabarcoding are also collected regularly.

Other long-term monitoring activities planned include soil physics, litter decomposition, carbon sequestration, and deer browsing. The Kienhorst intensive research site is also available for other research, and scientists and students are welcome to use it for their own studies. The site will also facilitate discussions with different stakeholders about future forest management in the Brandenburg-Berlin region and for testing innovative ideas.

Figure 3: Subplot with forest monitoring equipment (Source: Julia Kaplick, LFE).

Combining LiDAR data with the BWinPro growth simulator

In one sub-project, we use LiDAR data collected by our project partner HNEE and by the Landesbetrieb Landesvermessung und Geobasisinformation Brandenburg (LGB) to explore the potential of using point cloud-based digital stand models as the basis for forest growth simulation in BWinPro Brandenburg (Fig. 4).

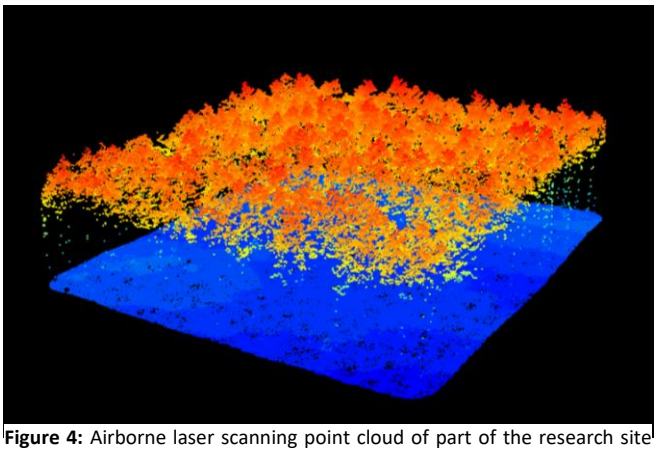

Figure 4: Airborne laser scanning point cloud of part of the research site (GeoBasis-DE/LGB) – (Source: Carlotta Michel, HNEE).

For ground truthing, we carried out a complete terrestrial field inventory over an area of 75 x 75 meters at the Kienhorst intensive research site and developed a reference stand model in BWinPro based on the collected data (Fig. 5).

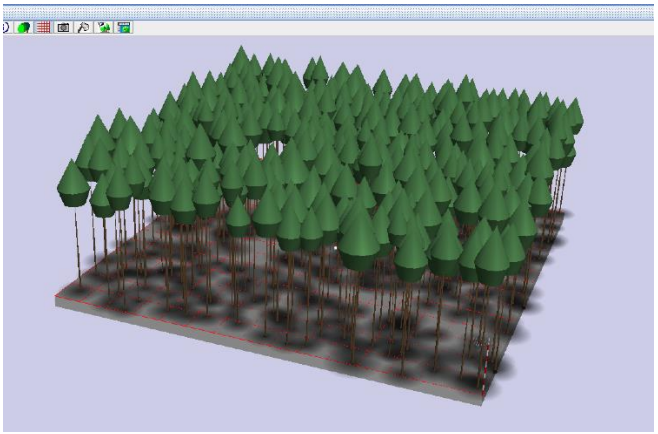

Figure 5: BWinPro model of part of the Kienhorst research site (Source: Carlotta Michel, HNEE).

Our next step is to develop stand models using the results of different LiDAR inventory methods (satellite, UAV, handheld) and compare the resulting biomass estimates to determine the practical value of combining these methods with BWinPro modeling for forestry applications.

Based on the developed stand models, we plan to reconstruct the applied overstory treatments using the BWinPro growth simulator in our investigation of the effects of different forest management strategies on wood production.

Further information

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