

Hcanopy, a new site index to describe mature and irregular forests productivity: the case of old growth beech stands

T1.17 Learning from the past to better inform the future: integrated approaches to increase forest health and resilience

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Abstract

Forests of Western Europe have long been shaped by economic considerations, far removed from the way natural ecosystem's function. Monocultures, regular stands, and the promotion of a few commercially interesting species are all choices that have influenced forest management in the past. In the 21st century, the full force of global change is making those involved in forestry rethink their approach to silviculture. In response to these changes, continuous cover forestry regeneration has been encouraged, using natural regeneration, and leading progressively to uneven-aged stands. Although this type of stand offers greater forest resilience, it is difficult to characterise, particularly in terms of productivity. Indeed, most of the indicators in the literature have been calculated for even-aged, often planted, and homogeneous stands, far from the definition we have given to the resilient forest of tomorrow.

In this context, we developed a new indicator to assess the productivity level of these uneven-aged stands using a variable that is stable over time: the maximum canopy height (Hcanopy). The aim of this study was twofold:

- (1) To identify the dendrometric parameter, based on easily available remote sensing data, that best represents stand productivity and allows for stands comparison, provided that the canopy consists of mature trees.
- (2) To assess which ecological parameters influenced the value of this indicator.

We focused on beech (*Fagus sylvatica*), and especially on mature and uneven-aged beech stands in old-growth temperate forests of Western Europe. These forests were divided into polygons characterized by homogeneous abiotic conditions. For each polygon, topographic, soil, climate and silvicultural data were extracted from raster layers, to analyse their effect on Hcanopy.

The analysis shows that the average maximum canopy height (Hcanopy), corresponding to the average height of the ten tallest trees per hectare, is the best indicator to describe the productivity level of this type of stand. The value of this indicator, calculated for each polygon were highly and significantly different between forest site types. A multivariate analysis is currently underway and should identify the variables that most influence Hcanopy.