



ZONIËNWOU
FORÊT DE SOIGNES

The Groenendaal Marteloscope

Field guide



Flanders
State of
the Art

INSTITUUT
NATUUR- EN BOSONDERZOEK

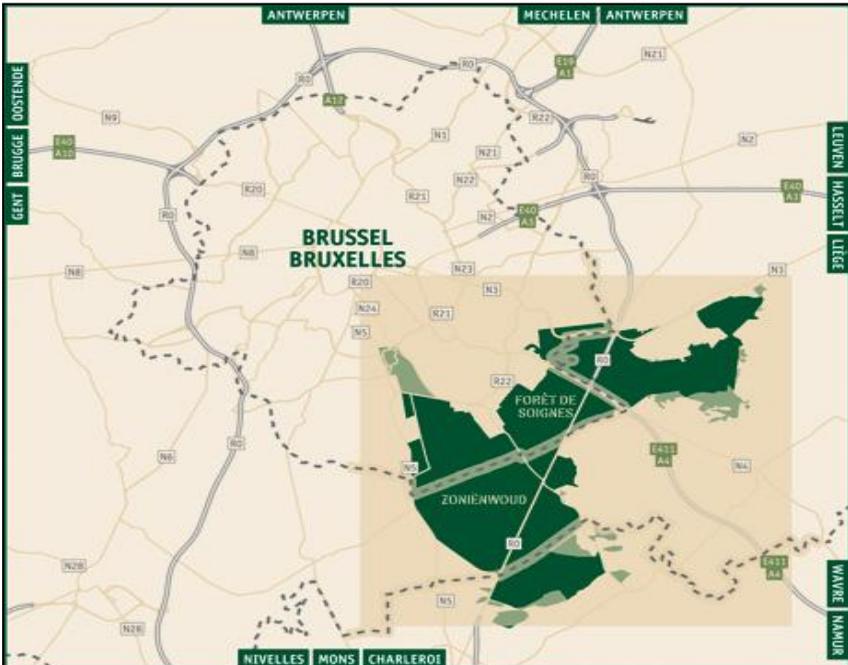


The Sonian Forest

The Sonian forest (Zoniënwood – Forêt de Soignes) is located in the centre of Belgium, right at the border to the capital of Europe. Today, it is almost completely surrounded by residential areas. It covers about 4,500 ha, and formally, the forest is subdivided over three administrative regions: Brussels Capital region, Flanders and Wallonia.

For many centuries the “*tire et aire*” management regime was applied with large-scale clear-cuts on more than 10 to 30 ha with a rotation period of 80-100 years. Within these cuts, about 30-50 trees per ha were left for a second rotation, resulting in larger timber and functioning as seed trees. Due to public protest, this ‘confronting’ management regime was halted in the second half of the 19th century, and replaced by long rotation periods with selective thinning and small group final fellings (femelslag).

The intention was to create irregular, uneven aged stands by artificial regeneration in smaller groups measuring from 4 ha to –later on– smaller than 0.5 ha. This (group) selection silviculture enables a more close-to-nature forest management with less drastic effects. It took about 100 years of discussion and hesitation to introduce this new management regime. The result of this process are forest stands with an extraordinary high amount of ‘overmature’ trees and forest stands.



5,000 ha

Total forest area

8.3 m³/ha

Annual increment

410 m³/ha

Actual average stock

31,000 m³

is the **annual increment** measured over the total forest

20,000 m³

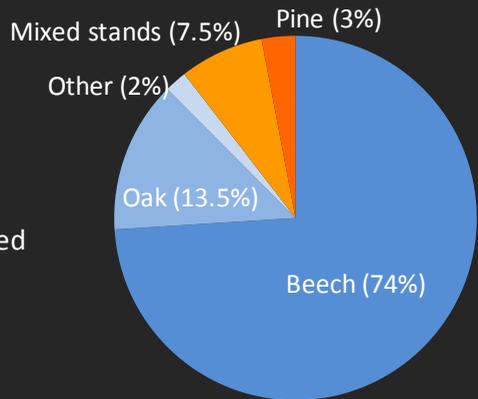
is the annual cutting-rate

> 2 million

visitors per year

> 250 km

roads and trails



97 %

Broadleaves

3 %

Conifers

At least **323**

species of fungi related to deadwood of beech

Integrative management



The Sonian forest combines high assets and requirements towards its different functions. The forest attracts yearly over 2 million visitors. It is quite a challenge to steer and organise this large number of visitors. Additionally it is an important biodiversity hotspot: it is one of the largest ancient woodland sites of Belgium, containing a very rich and specific biodiversity.

Set-aside areas and habitat trees –

In the forest, several larger and smaller set-aside areas have been delineated. They cover over 10% of the total area of the forest. Two strict forest reserves are present (235 ha and 83 ha). These set-asides contain many of the remaining old stands and almost 1/3 of all very large trees.

The new management plan of the Flemish part of the forest also foresees a more flexible conservation of old trees and large deadwood in the remaining multi-functional part of the forest.

As a basic principle, the overall dead wood amount has to increase gradually, to reach an average of at least 16 m³/ha (or 4% of the total aboveground biomass). This is achieved by allowing natural processes to deliver deadwood

(dying trees, windthrown or broken trees) and by leaving logging residues in the forest stands.

Habitat trees are given special attention, especially the very large trees. All very large trees were inventoried and they were all mapped. Higher concentrations outside the set-aside areas were marked as 'senescence islands'. For these trees, a dynamic approach is used: individual trees may still be cut but should be compensated by ingrowth from smaller size classes. The senescence islands (250 ha) should retain their "old-growth character", which implies no final cuts take place, only selective fellings.

Increased attention is given to existing and future habitat trees during thinning operations also in smaller tree size classes. They will not be removed and designated as retention trees.

Biodiversity concept in figures*

*Some figures for the Flemish administrative zone only

10 %

Set-aside forest areas

318 ha

Total area of 2 strict forest reserves

250 ha

Total area of senescence islands

>75 ha

Specific management for valuable open areas

> 7.000

Habitat and veteran trees

5-10 / ha

Target for habitat trees

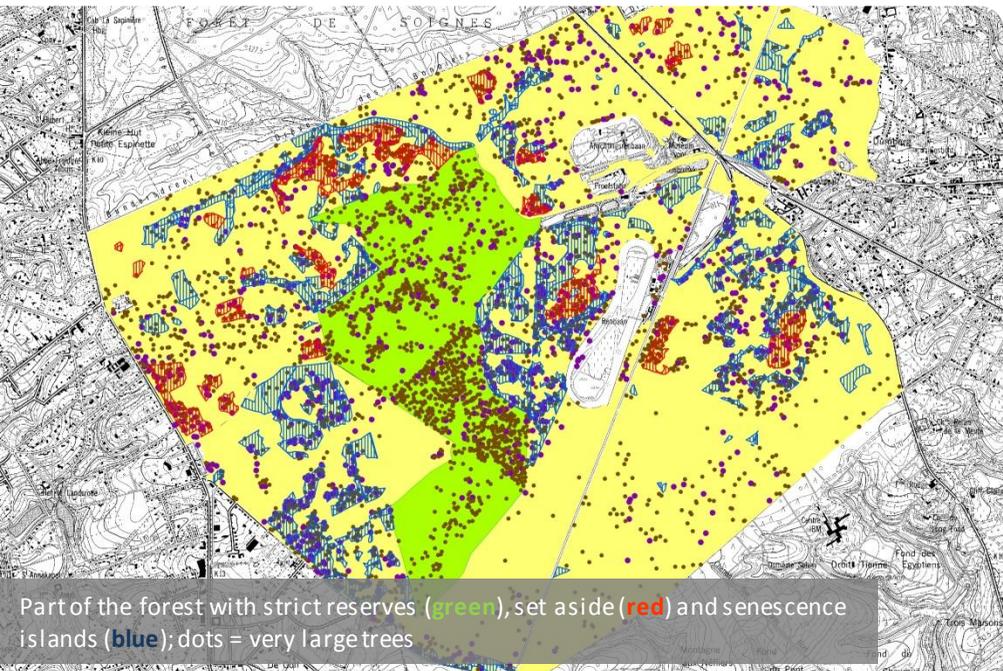
6 m³/ha

Average amount of deadwood

Target deadwood

4 % = 16 m³/ha

of total aboveground biomass



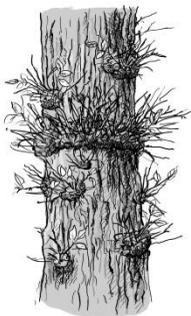
Part of the forest with strict reserves (green), set aside (red) and senescence islands (blue); dots = very large trees

Habitat structures

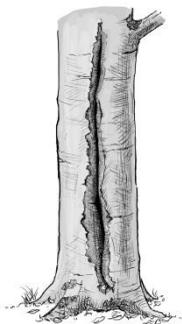
Large quantities of deadwood and a high density of old microhabitat-bearing trees are characteristic elements of natural forests, especially of the old-growth phases. These phases are often absent or rare in managed forests, even in forests under close-to-nature management. Also in selective harvests and thinnings, 'defective' trees referring to these old-growth phases (hollow, dead and languishing trees) are often removed. Yet, an important share of forest biodiversity is strictly or primarily dependent on these elements for their survival, especially 'saproxilic' species, that is species depending on deadwood.

Most species dependent of old-growth-elements and phases have become threatened. Conservation of biodiversity in commercial forest stands is mainly a question of conservation of adequate amounts of deadwood and retention of such microhabitat structures.

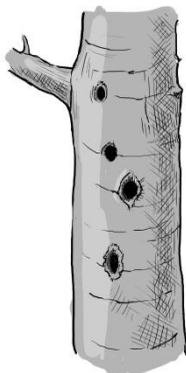
Witch brooms



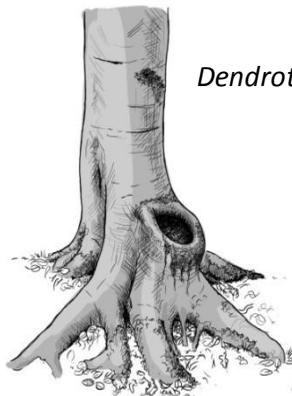
Cracks and scars



Woodpecker cavities



Dendrotelmata



...and biodiversity



Dendrocopos medius



Myotis bechsteinii



Gnorimus nobilis



Carabus auronitens putseyzi



Ganoderma pfeifferi



Hericium erinaceus

Site conditions

Altitude:	65 -130 m.a.s.l.
Forest ecological region:	Brabant Loess hills
Soil:	Luvisols and Podzoluvisols
Site description:	Tertiary calcium-rich sandstone and flint stone, covered with quaternary niveo-aeolic loess deposits
Mean annual temperature:	10.5 °C
Annual precipitation:	850 mm
Natural forest community:	<i>Milio-Fagetum</i> / <i>Endymio-Fagetum</i>

Milio-Fagetum beech forests are the Atlantic counterpart of the widespread *Luzulo-Fagetum* in the continental region. Ground vegetation is typically scarce. On the less acidic soils, the more neutrocline Atlantic Bluebell beech forests (*Endymio-Fagetum*). It is characterised by carpets of Bluebells (*Hyacinthoides non-scriptus*), and is considered the Atlantic counterpart (or subtype) of the *Asperulo-Fagetum* or *Melico-Fagetum* (Eur. Habitat 9130). Both vegetation types are well developed on this ancient woodland site, containing all indicative species. Within the Marteloscope, the vegetation contains elements of both forest types.

Species: *Pteridium aquilinum*, *Milium effusum*, *Oxalis acetosella*, *Convallaria majalis*, *Anemone nemorosa*, *Lamiastrum galeobdolon*, *Gagea spathacea* and *Tamus communis*

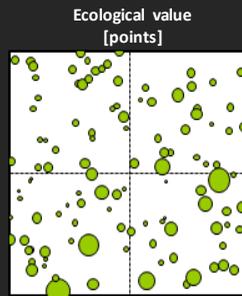
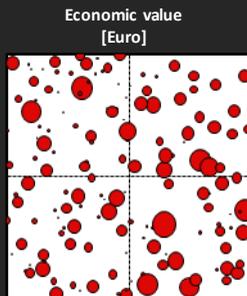
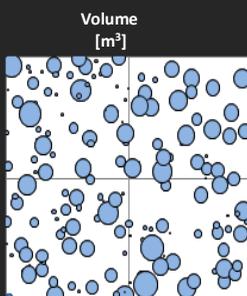
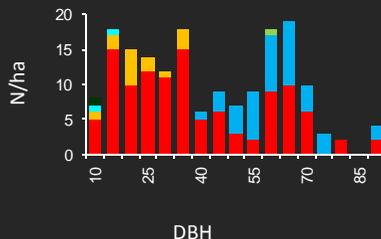


Stand characteristics

The **Groenendaal** Marteloscope is located in an uneven-aged stand with a mixture of beech and oak trees. The age of the oaks ranges between 100-200 years, the beeches are between 0 and 150 years old. The stand further contains some hornbeam, rowan, ash and single spruce and lime trees.

Stand data

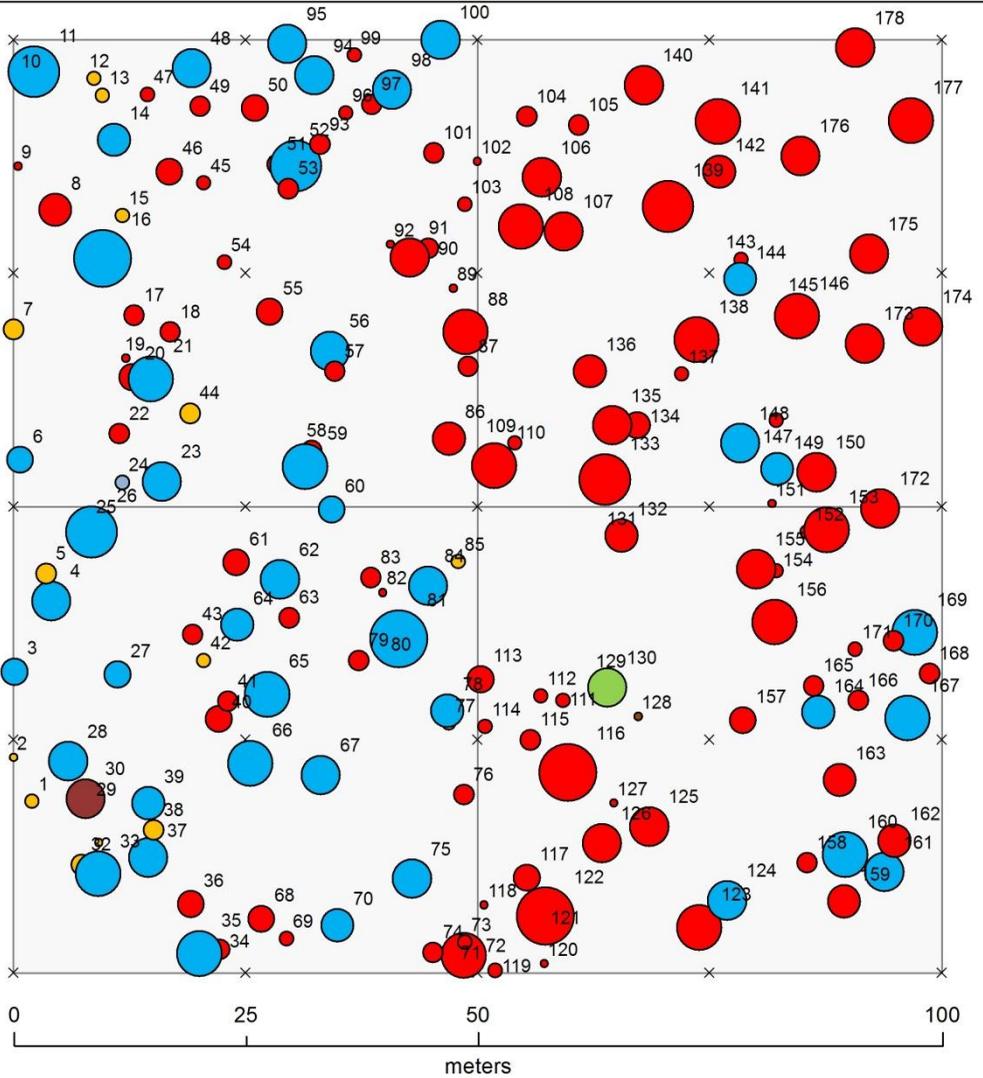
N [stems/ha]	178
BA [m ² /ha]	31.43
Volume [m ³ /ha]	388
Ecological value [points]	4,524
Economic value [Euros]	27,509.-



The **economic value (in €)** is estimated for each tree based on volume, stem quality and corresponding local timber pricelists.

The **ecological value (in points)** is assessed for each tree based on tree microhabitats, taking into account rarity of each habitat and duration for it to develop.

The evaluation of the ecological value is based on a comprehensive catalogue of Tree Microhabitats. It comprises 23 saproxylic and epixylic features such as cavities, large dead branches, cracks and loose bark, epiphytes, sap runs, or trunk rot characteristics. Tree Microhabitats are of prime importance for specialized and often endangered forest species of flora and fauna.



tree species

- beech
- oak
- hornbeam
- ash
- linden
- spruce
- rowan
- hazel

dbh [cm]

- 8,5 - 15,0
- 15,1 - 25,0
- 25,1 - 35,0
- 35,1 - 45,0
- 45,1 - 55,0
- 55,1 - 65,0
- 65,1 - 75,0
- 75,1 - 85,0
- 85,1 - 95,0

Example of interventions

A comparison of two interventions is shown as a result of a virtual tree selection exercise in the M-Scope Groenendaal. They highlight the different outcomes regarding economic and ecological values as well as the effects on the forest structure (basal area).

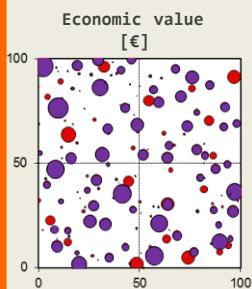
Scenario 1: - Positive selection of habitat trees, harvesting high quality trees

Scenario 2: - Strict removal of competitors to high quality trees, harvest of target diameter trees

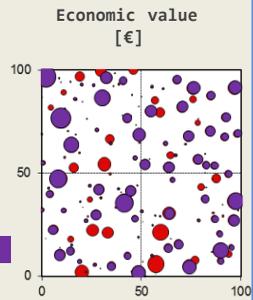
Interventions

Scenario 1

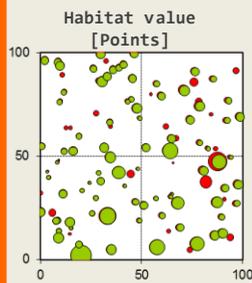
Scenario 2



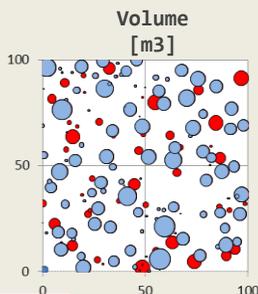
6,116 €



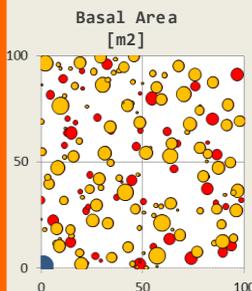
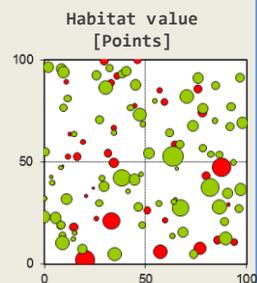
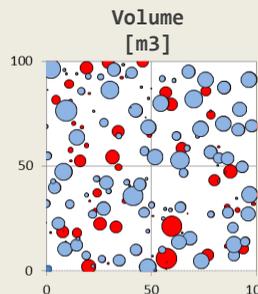
7,649 €



3630



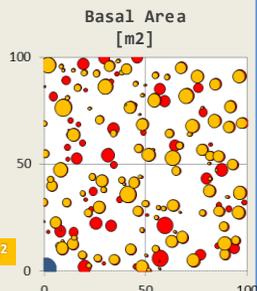
2485



22.6 m²

Removal
98.6 m³

Removal
116.2 m³



21.8 m²

Integrate+ is a demonstration project funded by the German BMEL to establish a European network of demonstration sites for the integration of biodiversity conservation into forest management.

The Integrate+ project runs from December 2013 to December 2016 and builds on a partner network from research and practice with a focus on implementation of integrative management and enhancing transnational exchange of experiences.



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