The Goumoëns Marteloscope

Field guide

canton de vaud

LIBERTÉ ET PATRIE

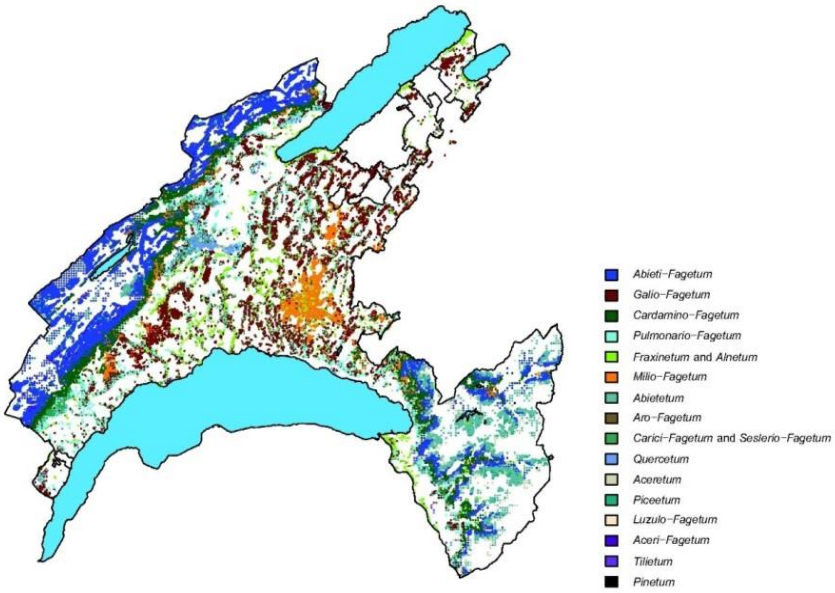
Canton Vaud forests

The Goumoëns Marteloscope is located in the forests of Canton Vaud in Switzerland, framed by Lake Geneva and Neuchâtel. The total forest area amounts to about 100,000 ha with 67 % being dominated by conifers and 33 % by broadleaves. The growing stock averages 350m^3/ha.

The Goumoëns Marteloscope itself is embedded in a forest area which has been able to develop naturally for many decades. This has allowed individual trees to grow to considerable sizes and develop large numbers of ecological structures. At the same time the trees display high economic values. Such forest stands ask for well designed management approaches to ensure balancing a multitude of interests.

Due to these reasons, the Goumoëns Marteloscope has been selected as an ideal object for displaying and discussing management strategies that take into account the preservation of habitat trees. Broadleaved species represent 86 % of the wood volume in the Marteloscope and is dominated by oak. Nearly three quarters of the trees have a diameter at breast height larger than 50 cm.

Forest associations of the canton of Vaud



.... in figures

100, 000 ha

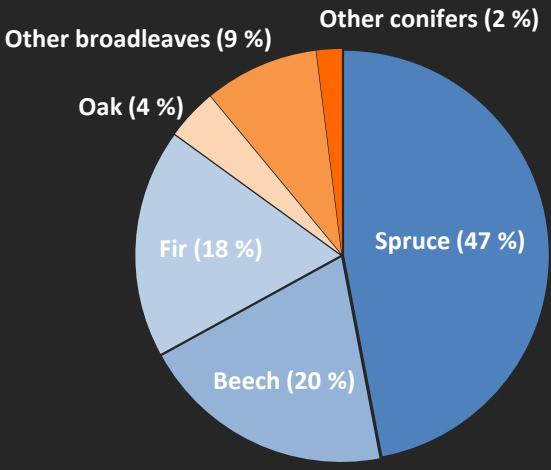
Total forest area

2-12 m^3/ha

Annual increment

351 m^3/ha

Actual average stock



625,000 m^3

is the annual increment measured over the total forest

500,000 m^3

is the annual cutting-rate

33 %

Broadleaves

67 %

Conifers

More than **1,700**

species of saproxylic beetles in Switzerland

Biodiversity concept

Forests host a high biological diversity. It needs to be protected at the level of habitats, species as well as at the gene level. Intensively managed forests usually offer suitable habitats only for highly adaptable species.

Canton Vaud and its forest biodiversity concept 2030

The Canton of Vaud has set as target to protect 10 % of its forested area by creating forest reserves. This objective is planned to be achieved by 2030.

Half of these reserves are to be designated as completely unmanaged (natural forest reserves) while the other half (special forest reserve areas) can be subject to management interventions favouring biodiversity.

Natural forest reserves aim at promoting the development of old stands with a considerable number of large trees with high amounts of dead wood on which many species, including such on red lists, rely. Mature forests which have not been exploited during the last 200 years are thus highly relevant.

They are more diverse in terms of vertical structure, age and species composition. Climatic events, fallen trees and other natural processes may have already created a mosaic of habitats for species with ecologically diverse requirements.

Managed forests are in general of more homogeneous structure. Targeted actions can be undertaken in such stands to enhance their biodiversity. Those can include favouring light dependent and wetland adapted species or increase the amount and diversity of deadwood.

The aim of the Canton Vaud biodiversity concept is to create an interlinked network of both natural and special forest reserves. This network will be complemented by smaller senescence patches (2 senescence patches/ha) and individually protected habitat trees (3-5/ha).

2.1 %

Set-aside forest areas

2,112 ha

Total area of forest reserves

1,516 ha

Wet forest biotopes

120 ha

Subsidized forest edges

0.1 % of forest area

Senescence patches

Objectives

10%

of forest area as forest reserves

3-5 / ha

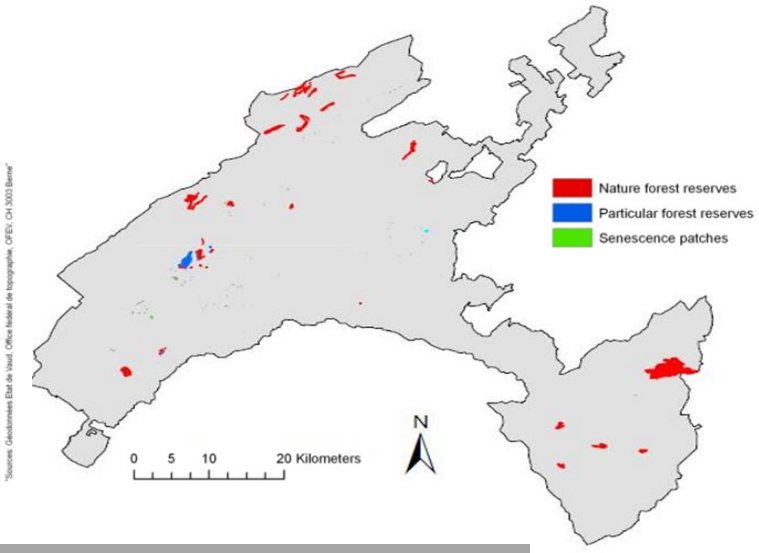
Target for habitat trees

2 %

of forest area senescence patches with 2 /ha

Target deadwood

20-25 m³/ha



Network of forest reserves

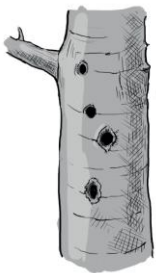
Habitat structures

Tree foliage is well known for providing shelter for birds and squirrels. However, the branches and the trunk often develop small structures on which many species of animals, plants and fungi rely. These small structures are called tree microhabitats. Tree microhabitats can vary according to many aspects, including e.g. tree location, state of wood decay, living or dead trees or their shape and texture. Microhabitats thus offer a wide variety of niches and attract a broad range of species.

Forest stands that contain different types of tree microhabitats are more likely to host a high diversity of microhabitat-related species. As tree microhabitats are constantly evolving, species inhabiting them are forced to move to new suitable conditions once their habitat has disappeared or to ensure reproduction. The frequency of tree microhabitat types in a stand is therefore crucial for the survival of species depending on them. Identifying trees carrying microhabitats allows to estimate the diversity potential of a forest stand. Such information provides a sound basis for designating trees for retention, e.g. as habitat trees with the result of maintaining or enhancing biodiversity in forests.

Fruiting bodies fungi

Crown deadwood



Woodpecker cavities

Bark loss

….and biodiversity

Picoides tridactylus

Punctum pygmaeum

Rosalia alpina

Lobaria pulmonaria

Lucanus cervus

Salamandra salamandra

Site conditions

Altitude:	**630 m.a.s.l.**
Forest ecological region:	**Western Swiss Plateau**
Soil	**Brown earth**
Site description:	**Tertiary calcium-rich sandstone and flint stone, covered with quaternary niveo-aeolic loess deposits**
Mean annual temperature:	**8° C**
Annual precipitation:	**1000 mm**
Natural forest community:	***Galio-Fagetum / Aro-Fagetum***

These beech forests occur in the submontane zone on deep brown soils. While the Galio-Fagetum association is mesophile and represents the climatic climax community at this elevation, the Aro-Fagetum association is found in more wet conditions, for instance in hollows. The forest canopy is dominated by Quercus robur (pedunculate oak), along with Quercus petraea (sessile oak) and Fagus sylvatica (European beech).

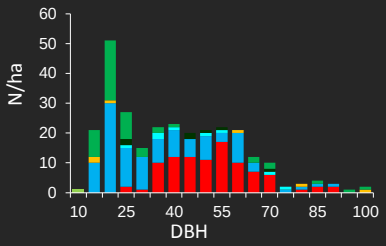
Species: Galium odoratum, Arum maculatum, Allium ursinum, Anemone nemorosa, Circaea lutetiana

Stand characteristics

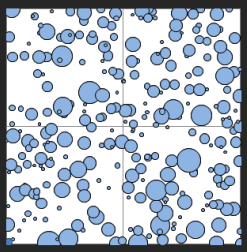
The Gourmens Marteloscope is located in an old mixed irregular forest dominated by oak and beech.

Stand data

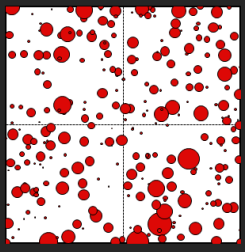
N [stems/ha]	282
BA [m²/ha]	44.31
Volume [m³/ha]	584
Habitat value [points]	9,383
Economic value [CHF]	43,206.-



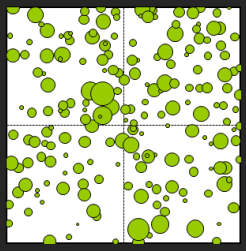
Volume [m³]



Economic value [CHF]



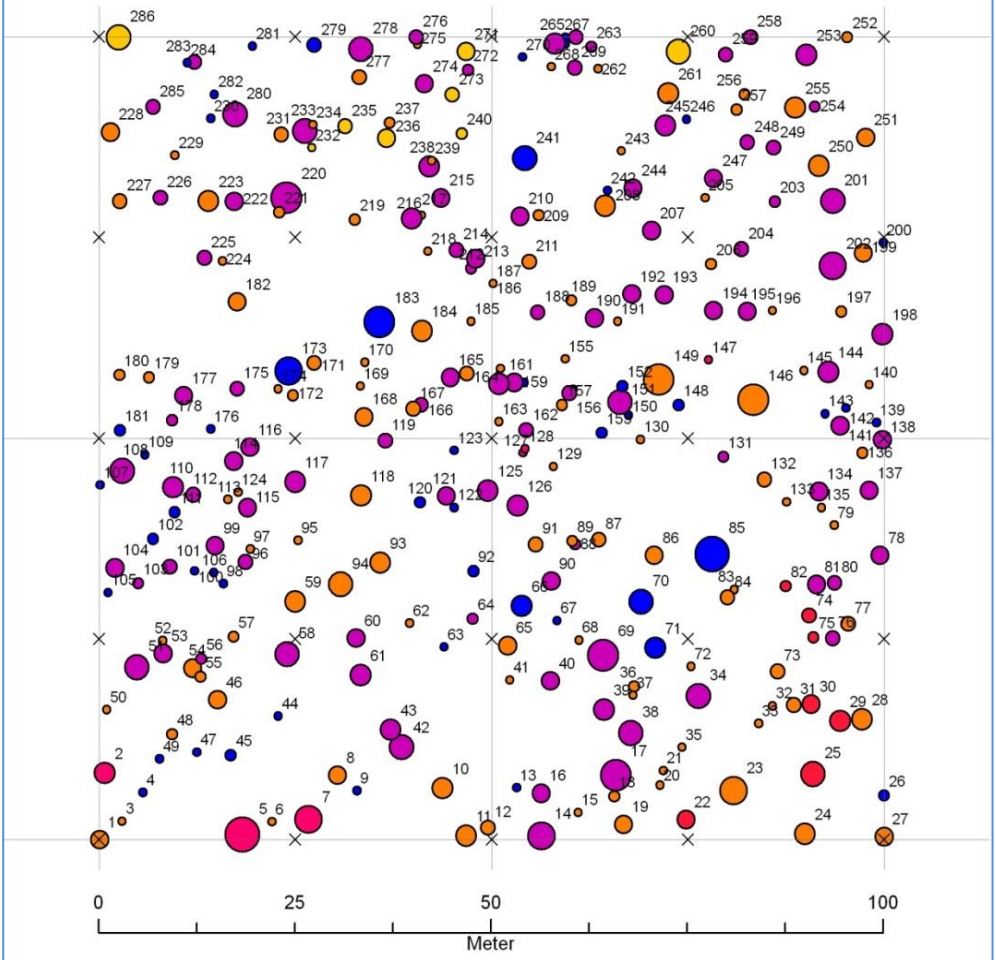
Habitat value [points]



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

The **habitat 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 habitat 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

- Ash
- Beech
- Fir
- Lime
- Oak
- Spruce

DBH (cm)

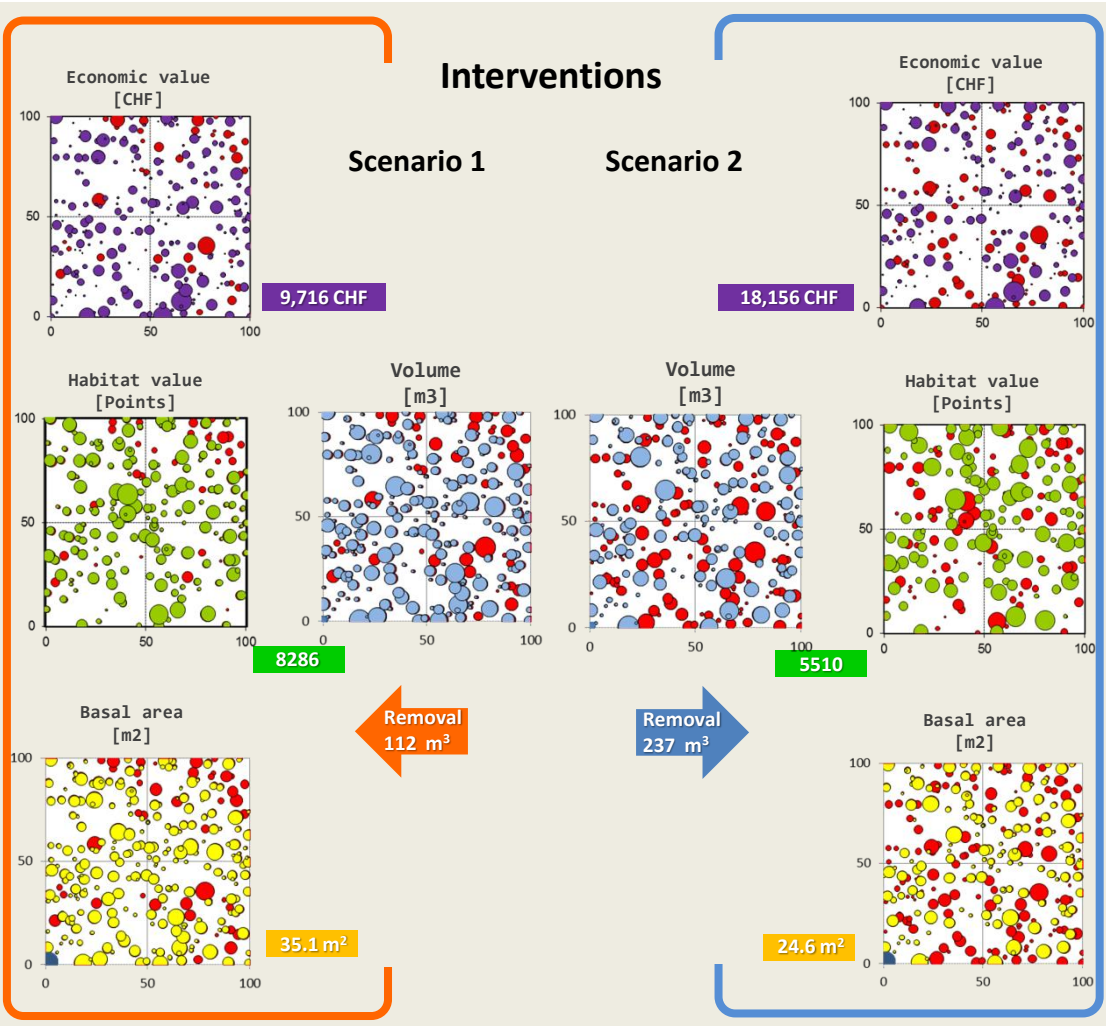
- 15.1 - 25.0
- 25.1 - 35.0
- 35.1 - 45.0
- 45.1 - 55.0
- 55.1 - 65.0
- 65.1 - 75.0
- 75.1 - 85.0
- 85.1 - 95.0
- 95.1 - 105.0

Example of interventions

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

Scenario 1: Positive selection of habitat trees, harvesting high quality trees (ecology/economy ratio 9.1)

Scenario 2: Positive selection of habitat trees, drastic reduction of volume (ecology/economy ratio 5)



Integrate+ is a demonstration project funded by the German Federal Ministry of Food and Agriculture (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.

Bütler, R., Marchon, J., Kraus, D., Schuck, A., 2015. The Goumoëns Marteloscope field guide. Integrate+ Technical Paper No. 5. 12 p.

Photos: Rita Bütler, Beat Wermelinger (*Lucanus cervus)*, Daniel Kraus

European Forest Institute, 2015

www.integrateplus.org