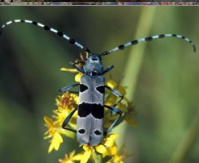# A conceptual framework for integrative forest biodiversity conservation in Europe

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Integrate+ Conference, Ebrach 2016

Forests have a high

- Ecological value

- Cultural value

© D. Goebel

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*Painting: Robert Zünd 1882*

Facts and figures

- Forest is the potential natural vegetation in temperate Europe and shows a relative high degree of naturalness

- Is habitat of plenty of species:
  - 40% of known species of central Europe
  - 10'000 species in beech forest types
  - Total forest reserve (Hessen, 75ha): 27% of D-fauna

- An outstanding importance for species-rich taxa like fungi, lichens und longicorn beetles (60–89%)

➜ High responsibility

➜ High effectivity and investment-benefit ratio

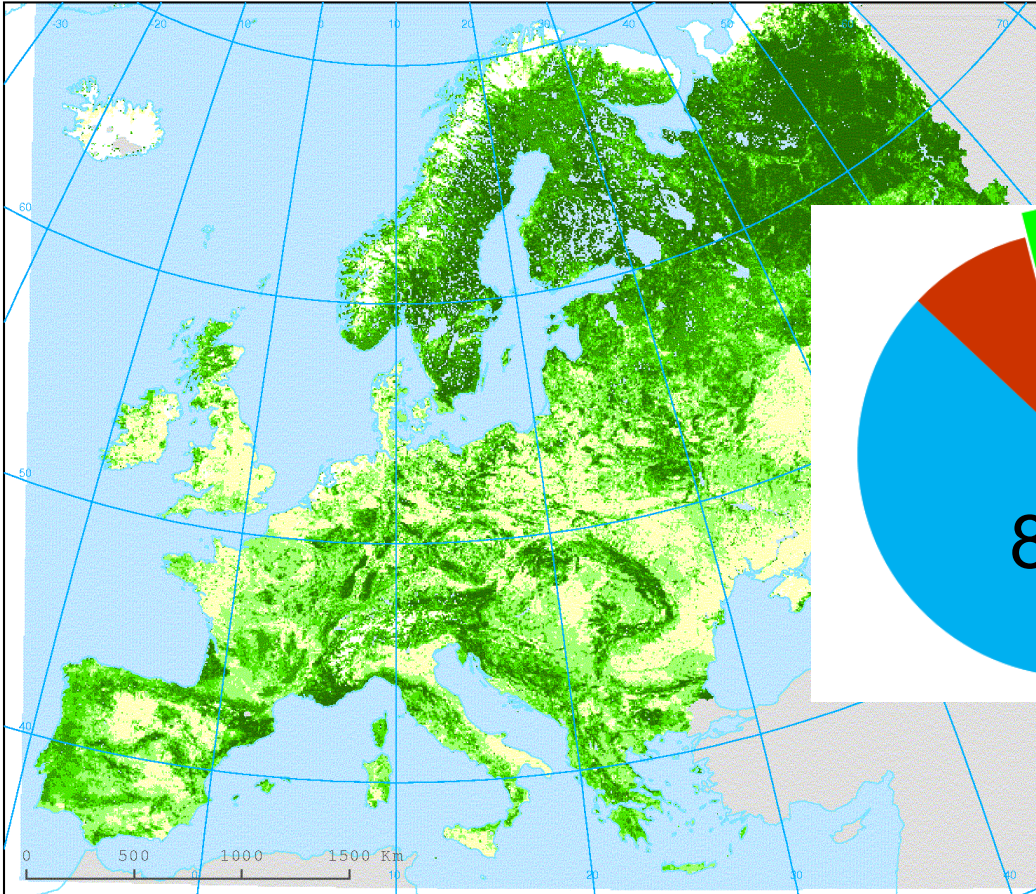How can we meet the rising demands for timber and energy resources at the least cost to biodiversity?
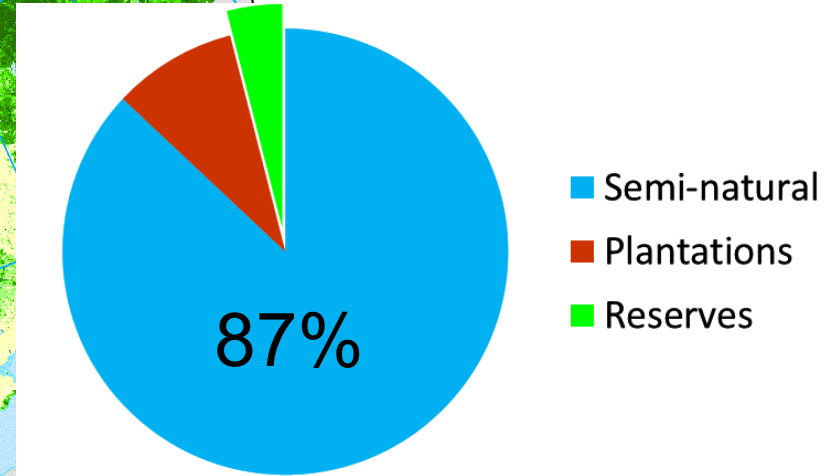
WSL

Land sparing vs land sharing
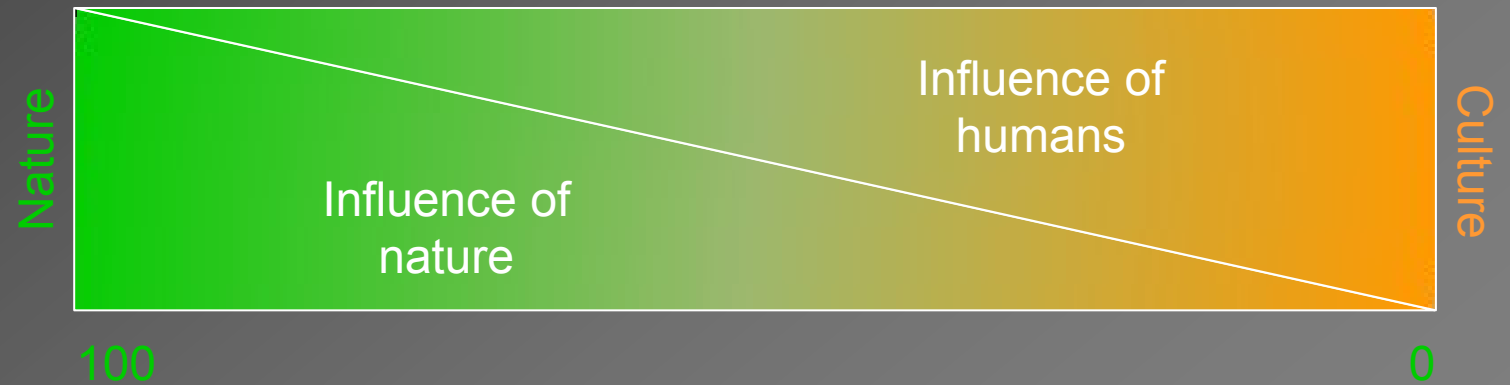
Forest use in cultural landscapes

Actual situation

- dominant habitat (44% of surface)

87%

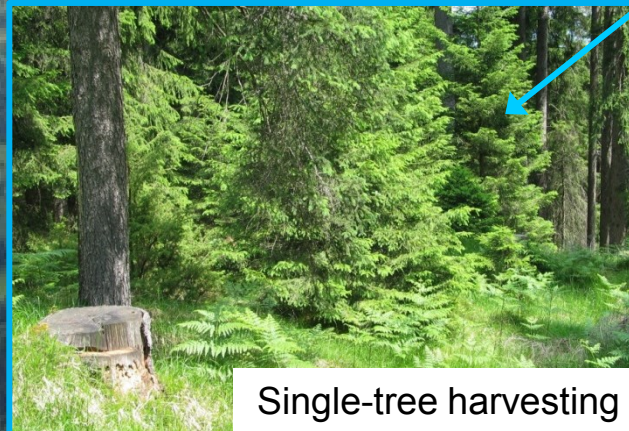- Semi-natural
- Plantations
- Reserves

- Multifunctional forestry

96% of forest is under use
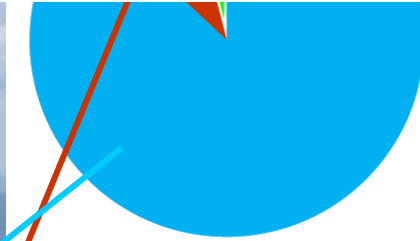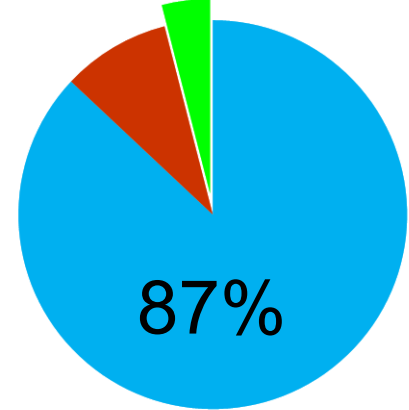

Reserve

Single-tree harvesting

Clear-cutting

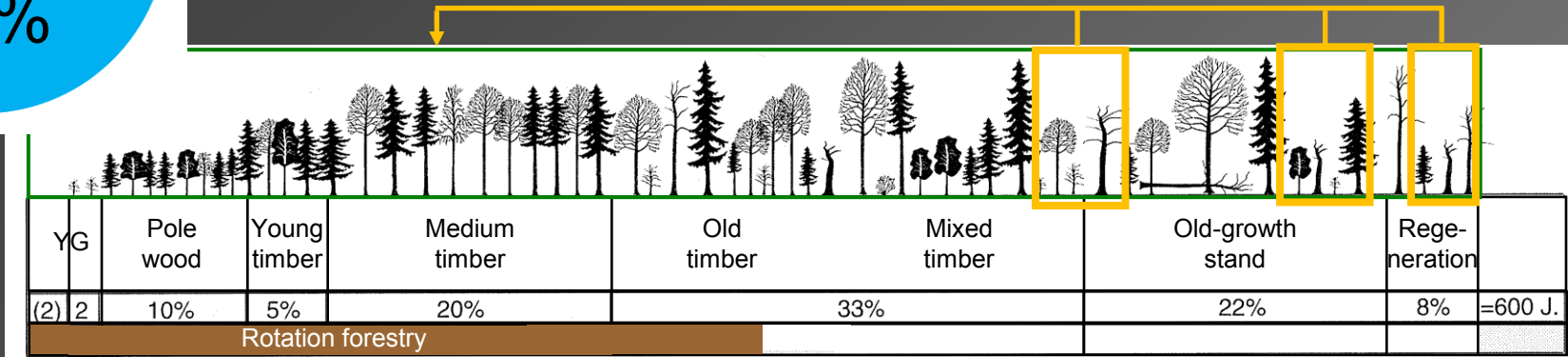*Paillet et al. 2009*

Natural legacy

National Park Podyjí, CZ

YG	Pole wood	Young timber	Medium timber	Old timber	Mixed timber	Old-growth stand	Rege-neration	
2%	10%	5%	20%	33%		22%	8%	=600 J.

Rotation forestry

Faunis...

Flor...

Max.

Min.

Time

High need to strictly protect the remaining pristine forest!
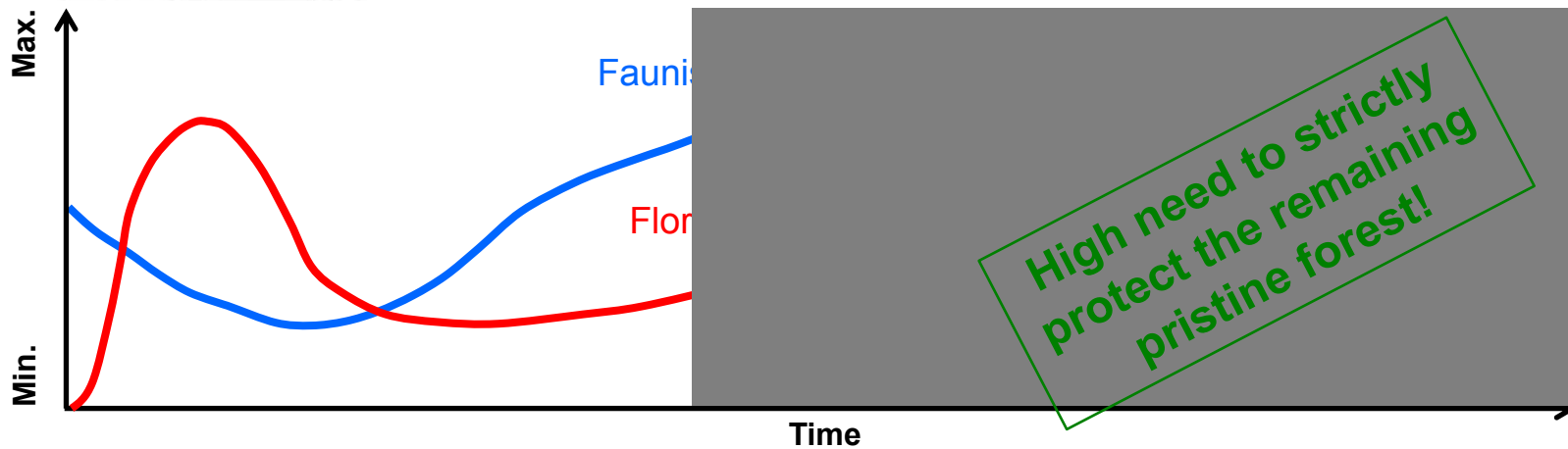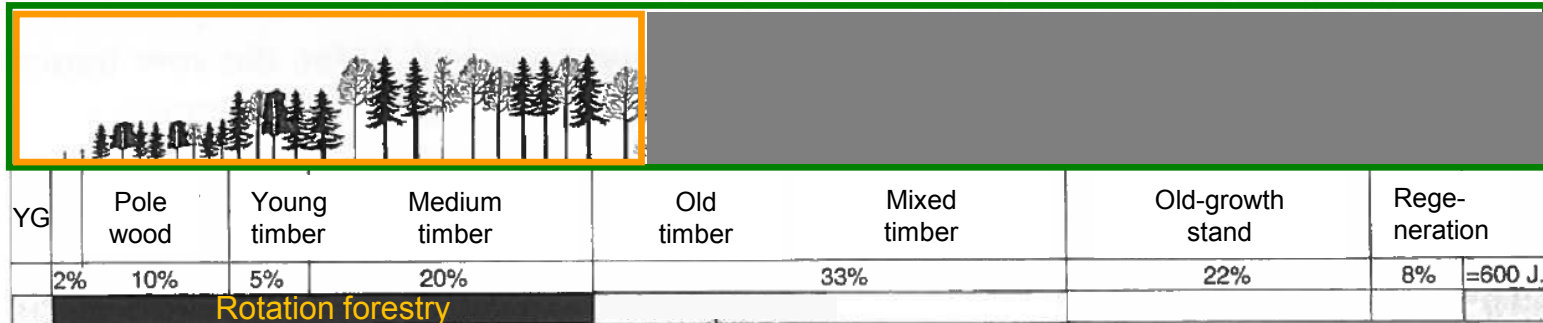
Integration of key elements of the old-growth forest

87%

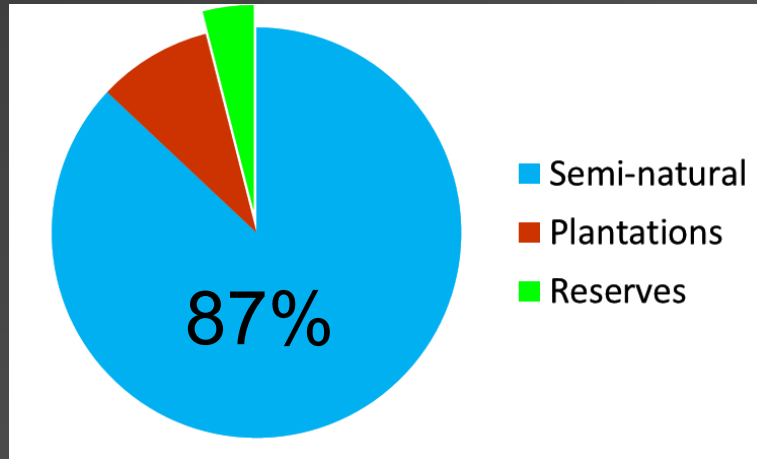|	YG	Pole wood	Young timber	Medium timber	Old timber	Mixed timber	Old-growth stand	Rege-neration	
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Rotation forestry

Integration of
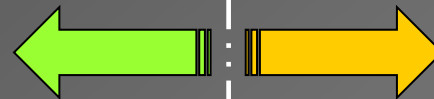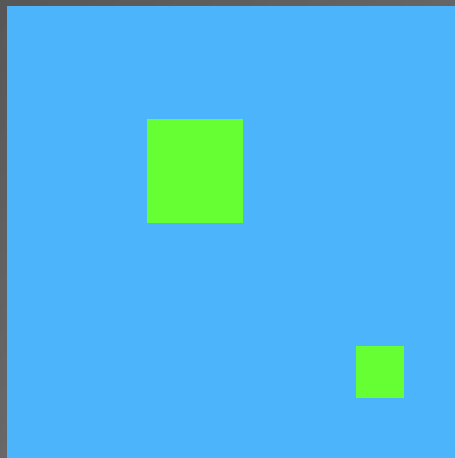
- Old-growth stands
- Death wood
- Rare forest types
- Habitat trees
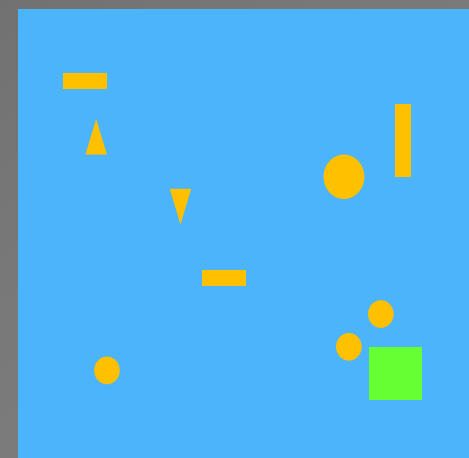- Special biotops
- Key structures
- Wildlife corridores
- …..

Scherzinger 2006, Bollmann & Müller 2012, Krumm , Schuck & Kraus 2013
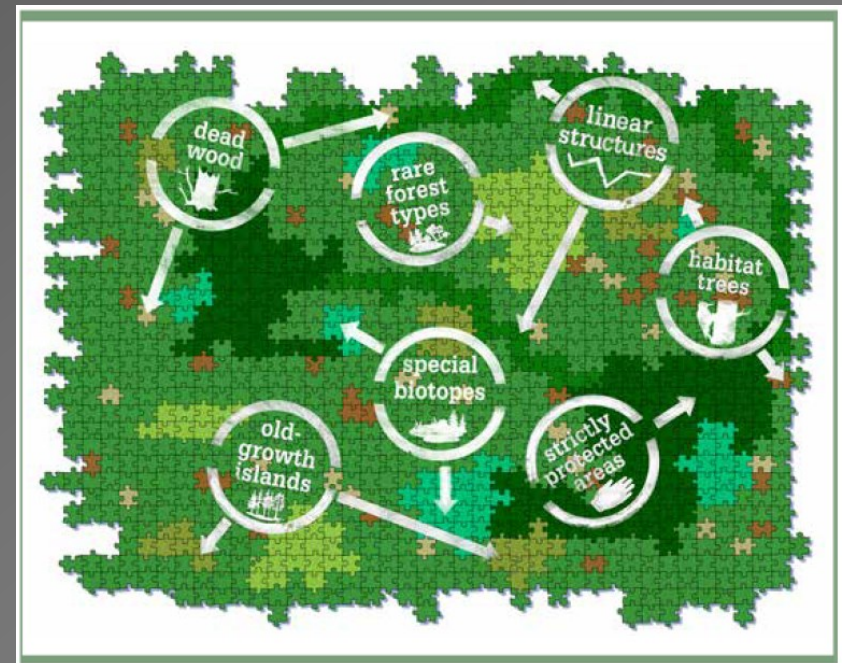
Integration of key structures into used forests

SEGREGATION ← → INTEGRATION

Trade-off

Gustafsson & Perhans 2010, Bollmann & Müller 2012
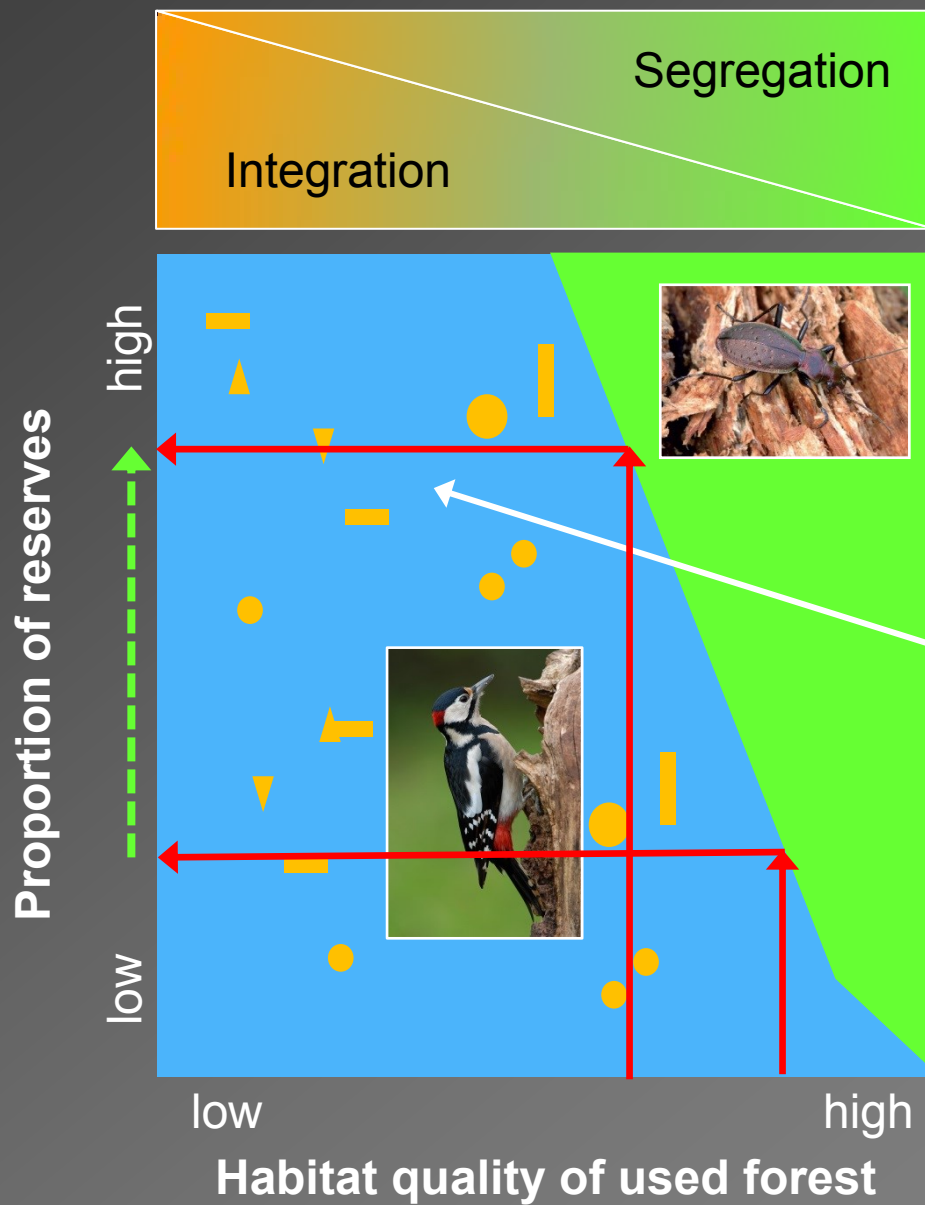
The 10 forest biodiversity factors

Emberger et al. 2013

Dead wood

LES 10 FACTEURS DE L'IBP

Emberger et al. 2013

Dead wood

20–30% of the forets fauna depends on dead wood (Siitonen 2001)

Rosalia longicorn
(*Rosalia alpina*)

Great capricorn beetle
(*Cerambyx cerdo*)

Zitronengelbe Tramete
(*Antrodiella citrinella*)

Hermit beetle
(*Osmoderna eremita*)

Státní oblastní archiv v Treboni

Dead wood and species richness in Switzerland

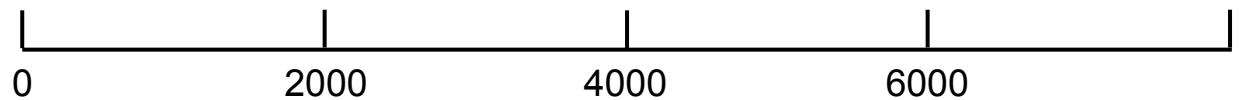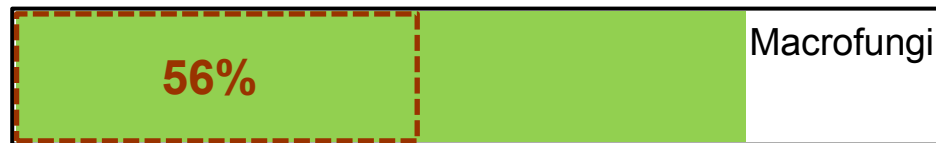**Legend:**
- No of forest species
- Part of saproxylique species among forest species

Coleoptera: **57%**

Macrofungi: **56%**

No of species (0, 2000, 4000, 6000)

© Bollmann

Biologically old trees

Giant trees and species richness

% of trees featuring at least one microhabitat

Hêtre

PB (20 - 25 cm)		30 %
BM (30 - 45)		40 %
GB (50 - 65)		80 %
TGB (70 - 85)		90 %
TTGB (≥ 90)		100 %

Sapin pectiné

PB (20 - 25 cm)		5 %
BM (30 - 40)		10 %
GB (45 - 60)		20 %
TGB (65 - 95)		30 %
TTGB (≥ 100)		70 %

0 %   50 %   100 %

Foto: P. Rienth

From Emberger et al 2013, after Larrieu & Cabanettes 2012
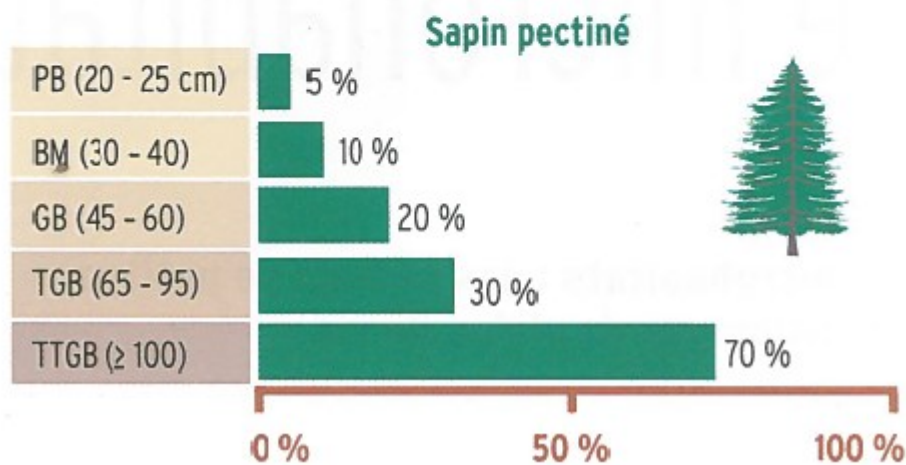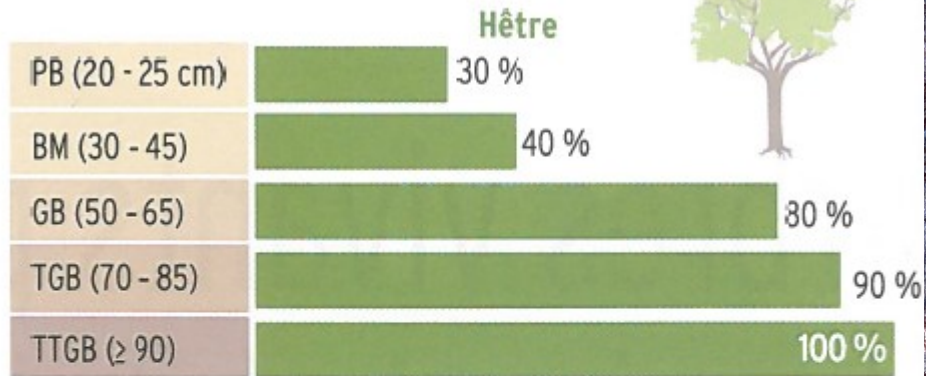
Dendro-microhabitats in pristine forests

Dendro-microhabitats	N/ha	% Trees	BHD [cm]
1. Dead wood	82	19	23
2. Branch holes	40	9	21
3. Trunk breakage	8	2	21
4. Perennial polypores	2	1	64
5. Bark loss	27	6	41
6. Crack	10	2	42
7. Cavity	14	3	36
8. Cavity with mould	10	2	44
9. Trunk cavity	4	1	57
Total	**150**	**34.5**	27

< 2-4x less than in used forest

Winter & Möller 2008, Commarmot et al. 2016
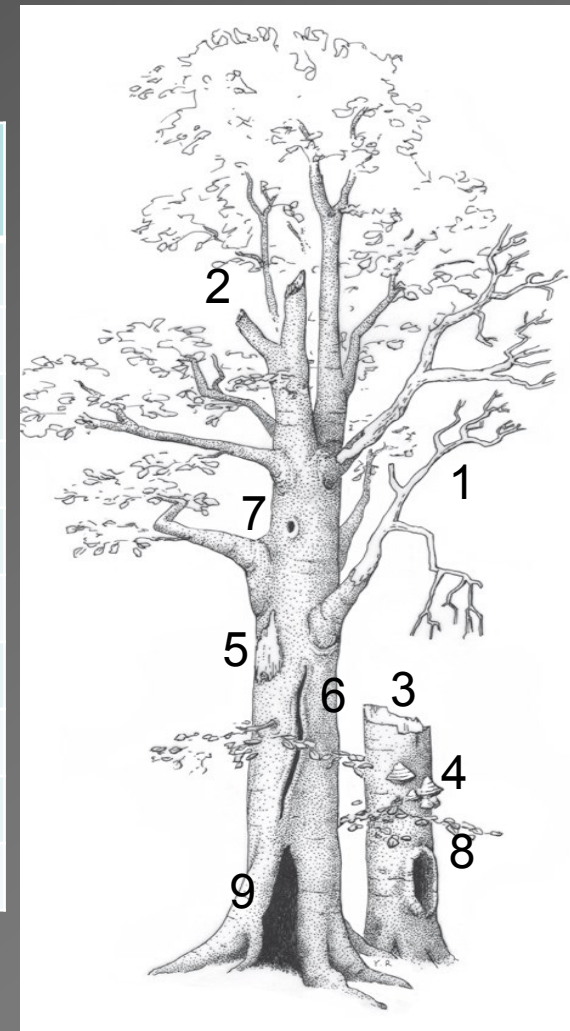
Dendro-microhabitats

Open forest stands

LES 10 FACTEURS DE L'IBP

7 facteurs liés **au peuplement** et à **la gestion forestière**

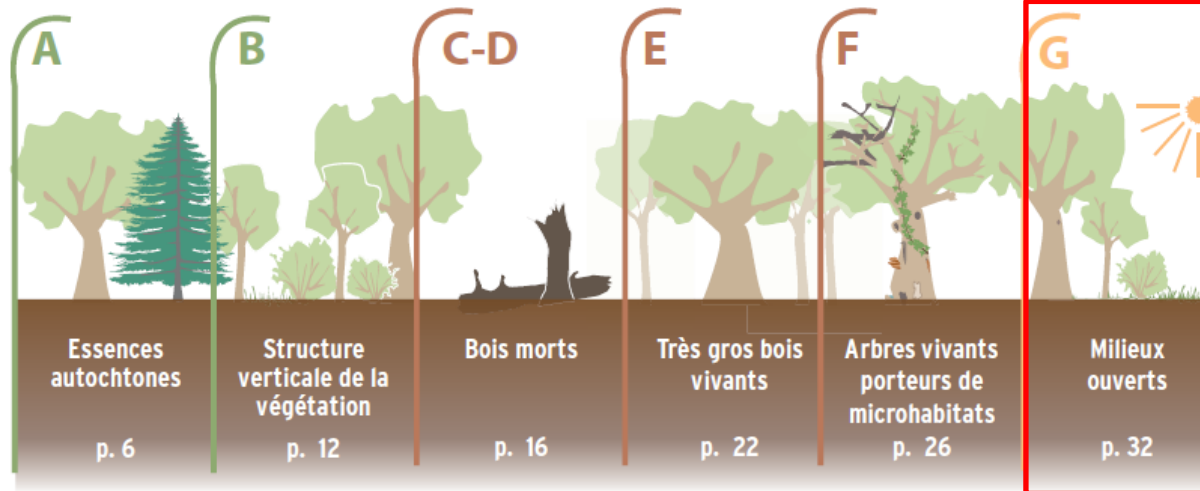| A	B	C-D	E	F	G
Essences autochtones	Structure verticale de la végétation	Bois morts	Très gros bois vivants	Arbres vivants porteurs de microhabitats	Milieux ouverts
p. 6	p. 12	p. 16	p. 22	p. 26	p. 32

3 facteurs essentiellement liés au **contexte**

H	I	J
Continuité temporelle de l'état boisé	Milieux aquatiques	Milieux rocheux
p. 36	p. 42	p. 48
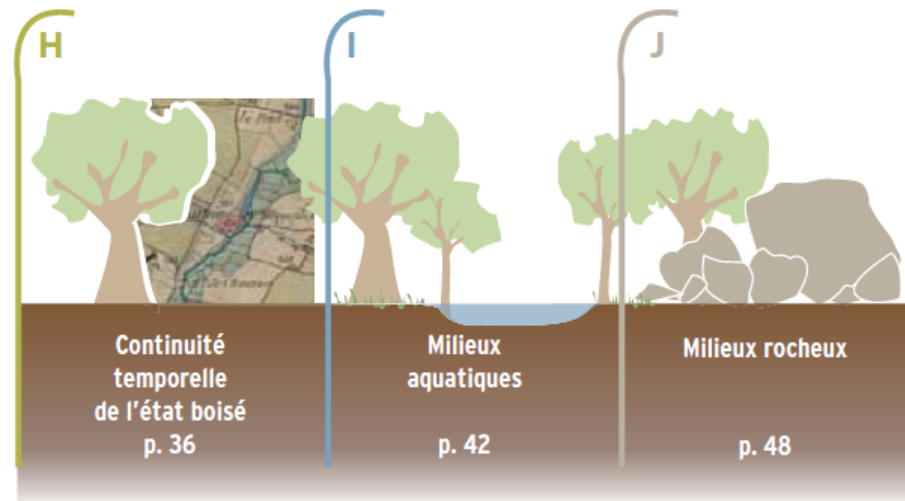
- High density of light demanding species (e.g. butterflies, birds, orchids)

- Promotion of early successional species

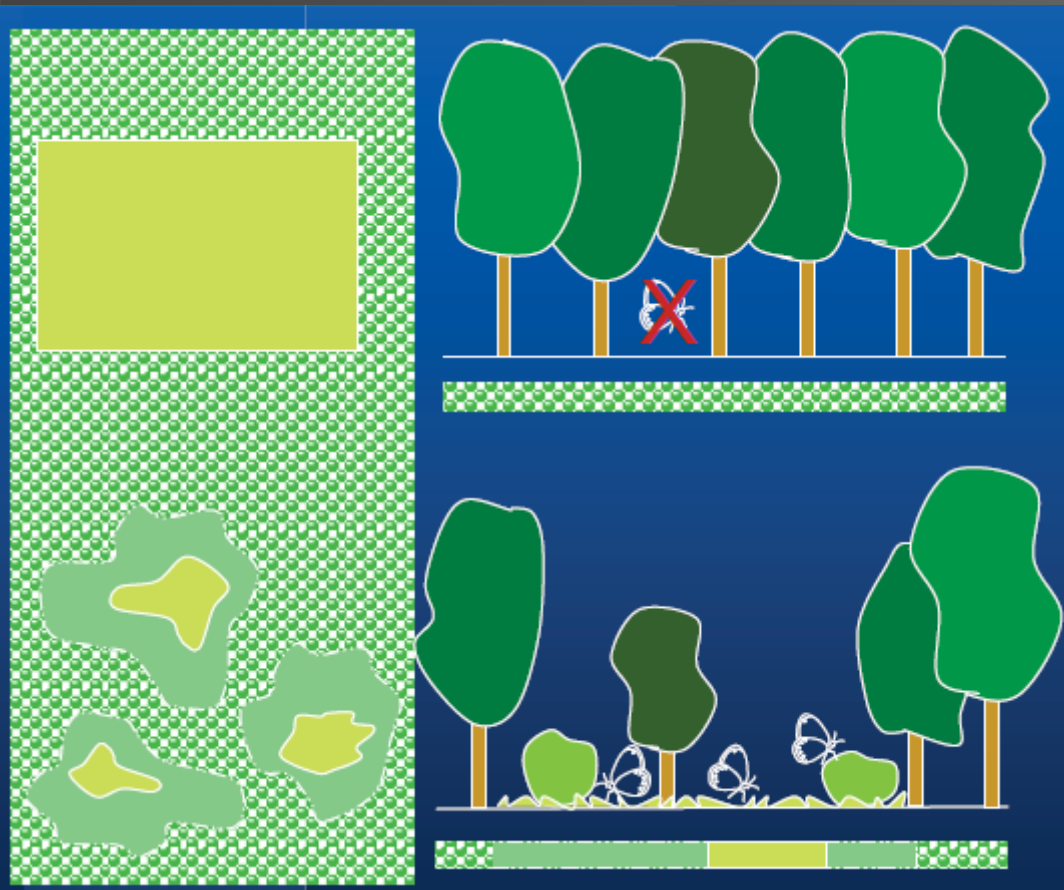- In combination with crown dead wood, a species-rich habitat
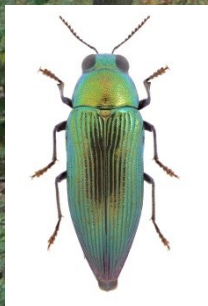
Eurythirea quercus
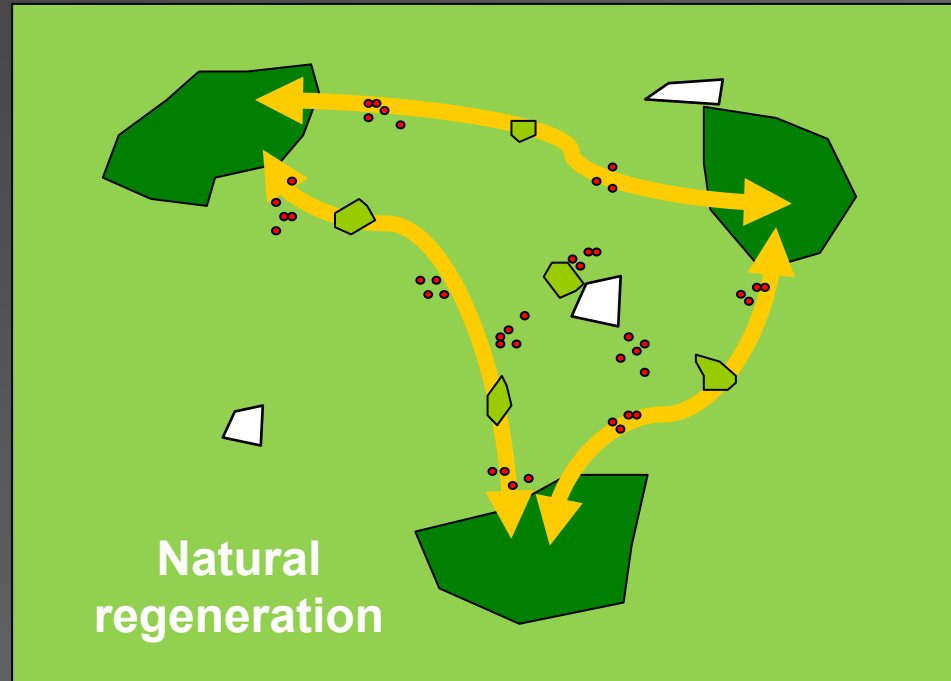
Endangered Scarce heath
(*Coenonympha hero*)

- Dense forest with large, distinct gaps
  → no habitat

- Semi-open forest with various successional stages
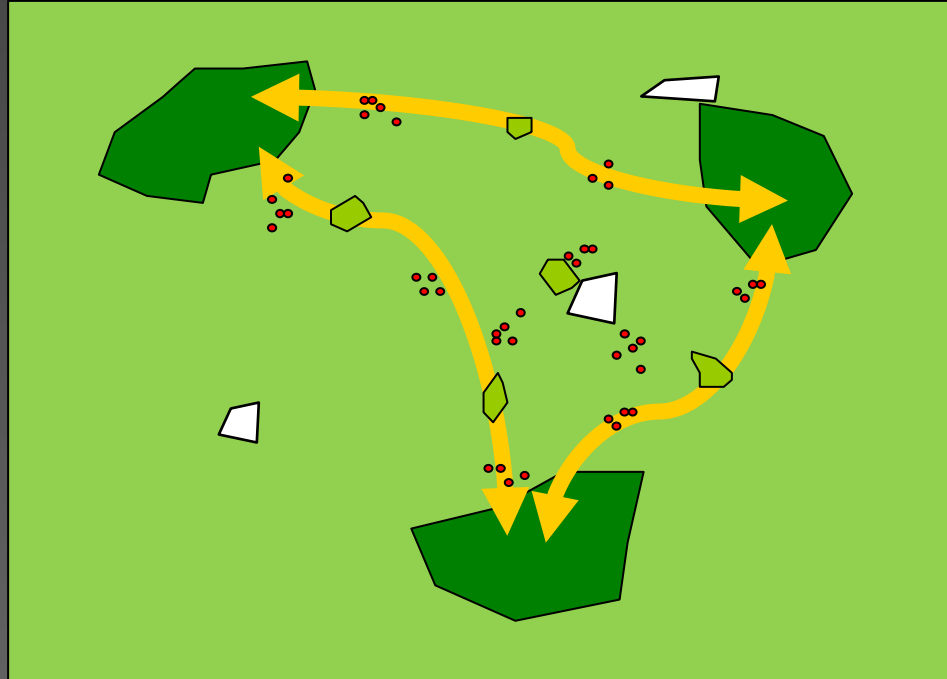 → good microclimate, optimal habitat

Top view   Lateral view

© M. Dolek

Conclusions

- Omit structural homogeneity, support structural heterogeneity
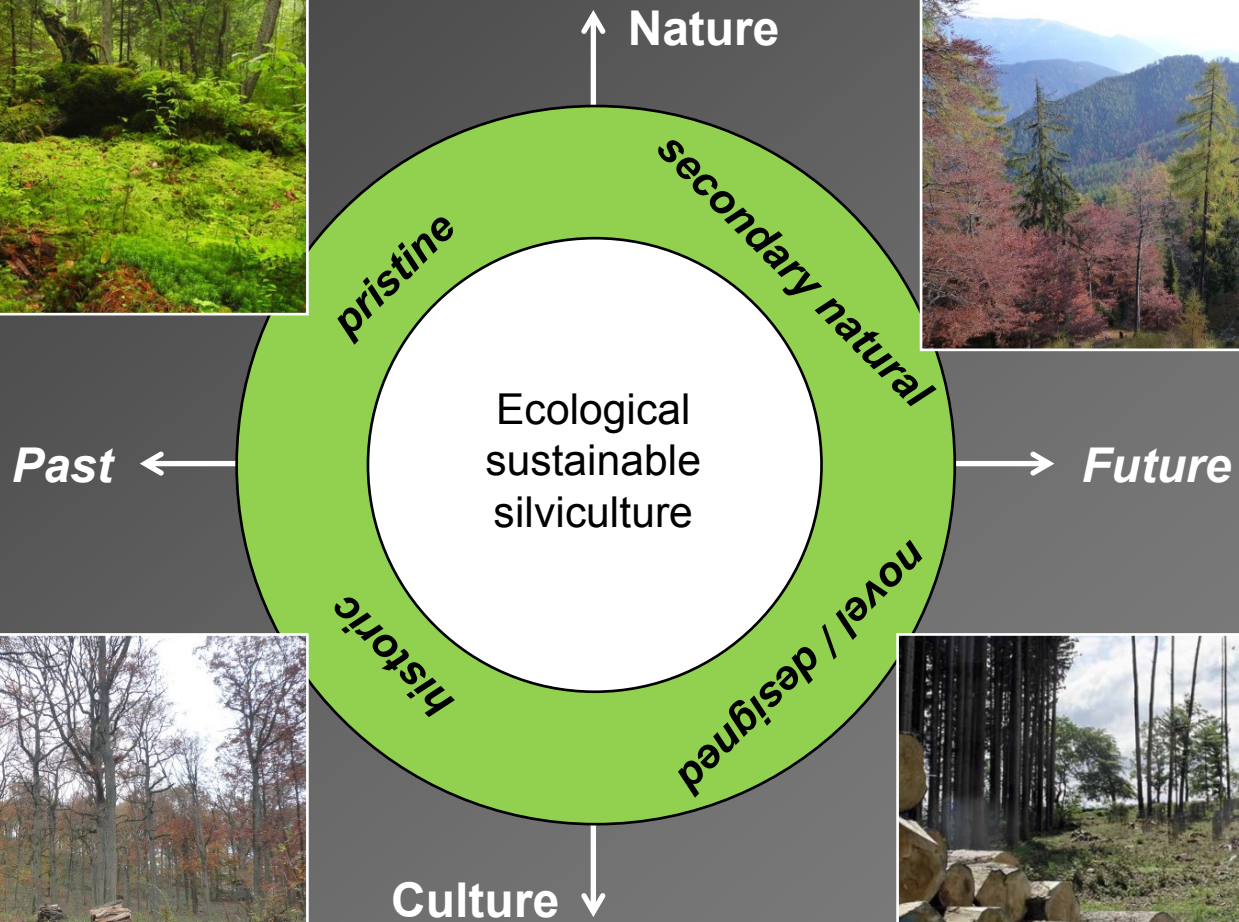

Natural regeneration

- Dead wood
- Habitat trees
- Old-growth stands
- Gaps
- Forest reserves

Support complementarity of applied nature conservation tools

Support complementarity of applied nature conservation tools

Nature

pristine

secondary natural

Past

Ecological sustainable silviculture

Future

historic

novel / designed

Culture

Thank you for the attention!

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