

Close-to-Nature-Forestry: principles, challenges and future perspectives



Lessons from the Pro Silva Network

Tomáš Vrška

MENDELU–UFE CEO & Pro Silva president

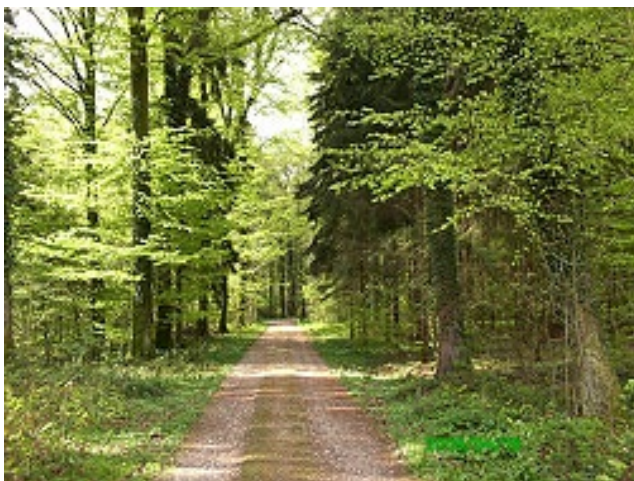
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Louvain, May 29th, 2026



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University is owner of
property = independent of
the state

Unique variability of forest
sites



Teaching in the field



Science put into the practice



- Average rotation: 112 years, average regeneration period: 32 years
- Standing volume: $234 \text{ m}^3 \cdot \text{ha}^{-1}$
- Harvesting volume: $74.900 \text{ m}^3/\text{year}$
- Volume increment: $8,4 \text{ m}^3 \cdot \text{ha}^{-1}/\text{year}$
- Strict forest reserves: 9% of property + old-growth patches 1% = 10% unmanaged
- Mainly mixed stands - conifers (35%), broadleaved (65%)
- Norway spruce (14%), Scots pine (7%), larch (9%), Douglas fir (3%), silver fir (2%).....
- European beech (39%), oaks (12), hornbeam (6%), maples (2%), linden (2%), ashes (2%)

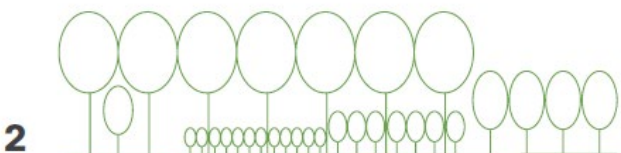
19 silvicultural models

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Multi-aged
shelterwood
system



Coppice
with
standards



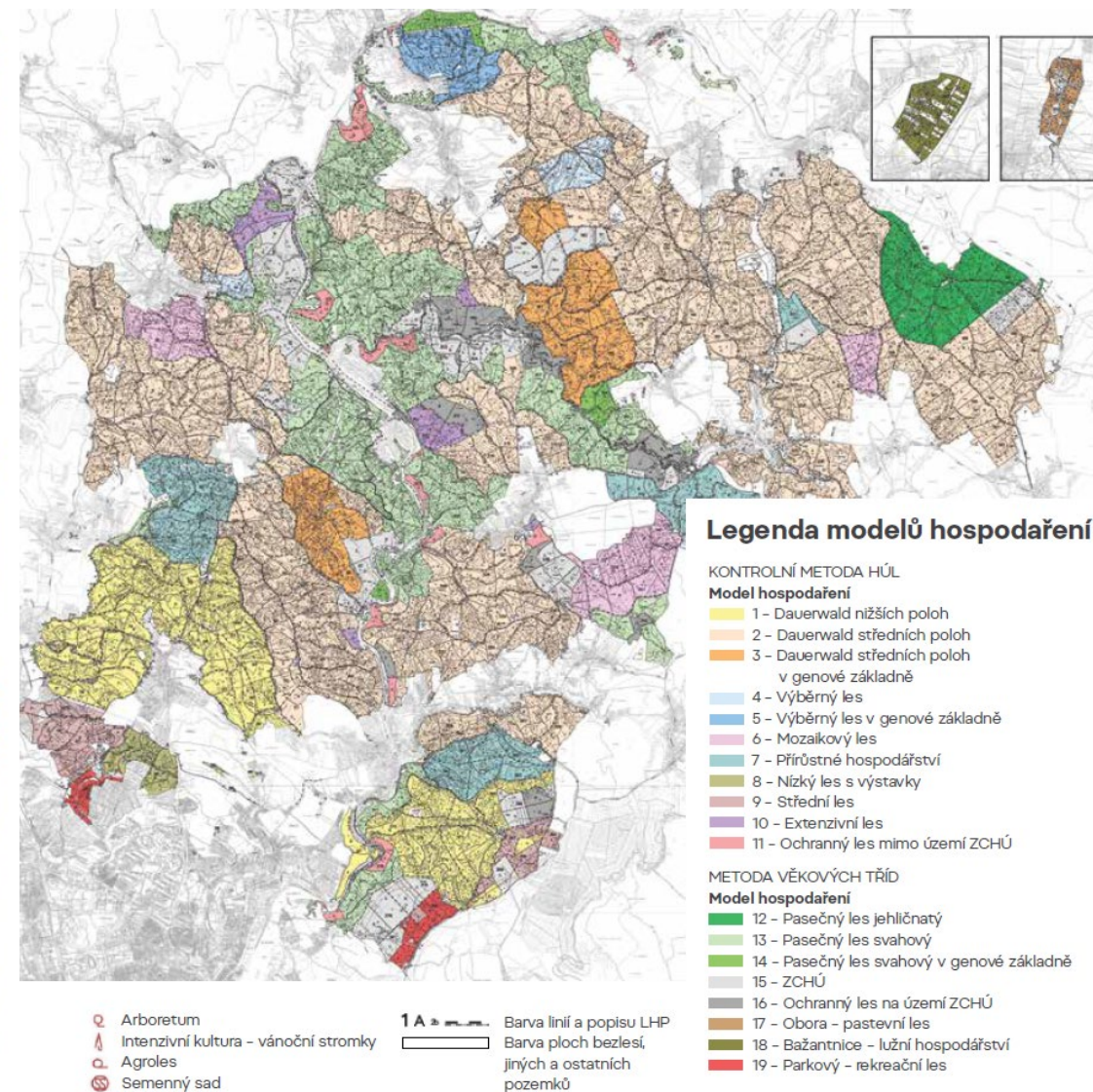
Mosaic
model –
maximizing
increment



„Dauerwald“



Single
selection
model





Sawmill

Plant nursery



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Chatteau Křtiny

- congress centre
- hotel
- restaurant



Uncertainty: Tree mortality

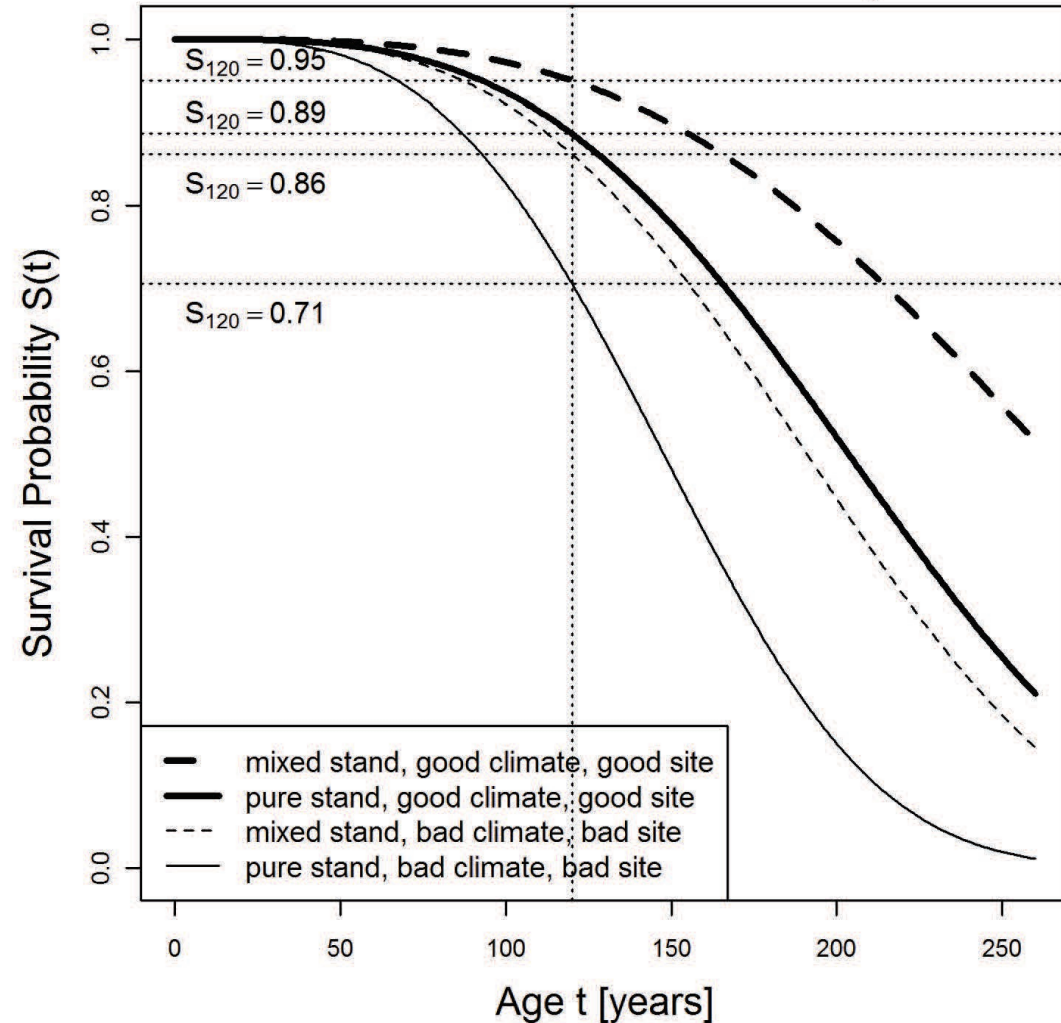
Forestry is a field that currently works with the highest level of uncertainty!

How much time do we have to change the forests?

40-70 years?

Do you know some other stronger challenge?

Effect of mixture on survival probability



European perspective



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Green Deal – circular (bio)economy – timber as the renewable resource – high quality stems for long-term useful products; cascade use chain;

EU Forest Strategy for 2030 – mitigation of climate change, **resilience** of forests, closer-to-nature forestry

EU Biodiversity Strategy for 2030 – stop the loss of biodiversity

Nature Restoration Law – protect 30 % of land/sea (20+10)

+ new potential **EC certification system** for closer-to-nature-forestry

= to change the state of European forests

Never ending questions: How? When? How fast? Who?

Pro Silva solution



- **Close-to-Nature Forestry (CTNF)** is an approach to forest management that maximizes the use of the creative forces of nature and respects more of the natural processes in silviculture. In accordance with the four⁴ Pro Silva principles, more stable, irregular and diversified forests are created, thus benefiting biodiversity, landscape conditions, diverse timber production, the provision of more ecosystem services.
- **Continuous Cover Forestry (CCF)** is an approach to forest management that aims to develop structurally, visually and biologically diverse forests, in which sustainable production of high-quality timber is achieved alongside the provision of a wide range of ecosystem services.

CTNF integrates 4 Pro Silva Principles:

- conservation of ecosystems, biodiversity
- protection of soil and climate
- production of timber and other products
- recreation, amenity, and cultural aspects



CTNF advantages

If we maximise the use of creative forces of the nature:

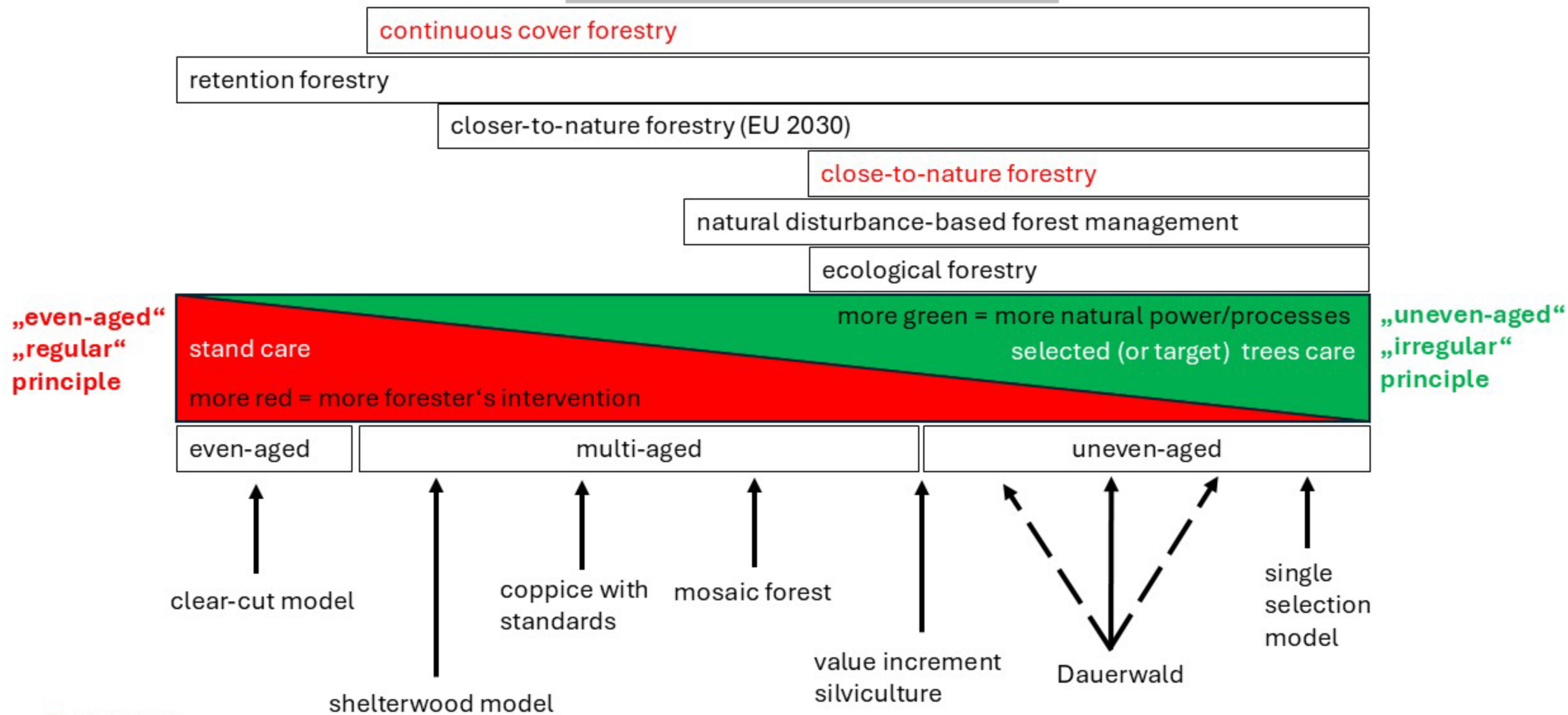
= lower human input to produce high quality timber continually = it saves money

= we work with more complex ecosystem = saving biodiversity (more irregularity) = higher resilience

= we have to work with qualified responsible workers (no other way) = support of local people

triple WIN strategy – HQ timber / biodiversity support nad higher resilience / local people

CONCEPTS: science + policy



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MODELS: practice

Vrška T. et al. 2025

Everything what we do in forestry must always be related to a certain spatial scale !!!

1 - Tree scale

2 - Stand scale

3 - Landscape scale

1 – TREE SCALE



CTNF works with individual
selected trees only





OPEN ACCESS

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Stand structure is more important for forest productivity stability than tree, understory plant and soil biota species diversity

Tao Wang, Lingbo Dong and Zhaogang Liu*

Key Laboratory of Sustainable Forest Ecosystem Management-Ministry of Education, College of Forestry, Northeast Forestry University, Harbin, China

- the structure of the stand is more important than the species composition for the stability of production in the future
- we can not say the tree species composition doesn't matter, but structure is a priority
- we can change the spatial structure faster than the species composition !!!

Forest stand 175C2a - THINNINGS

from below weak

main layer weak

main layer strong

main layer very strong



20%

22%

37%

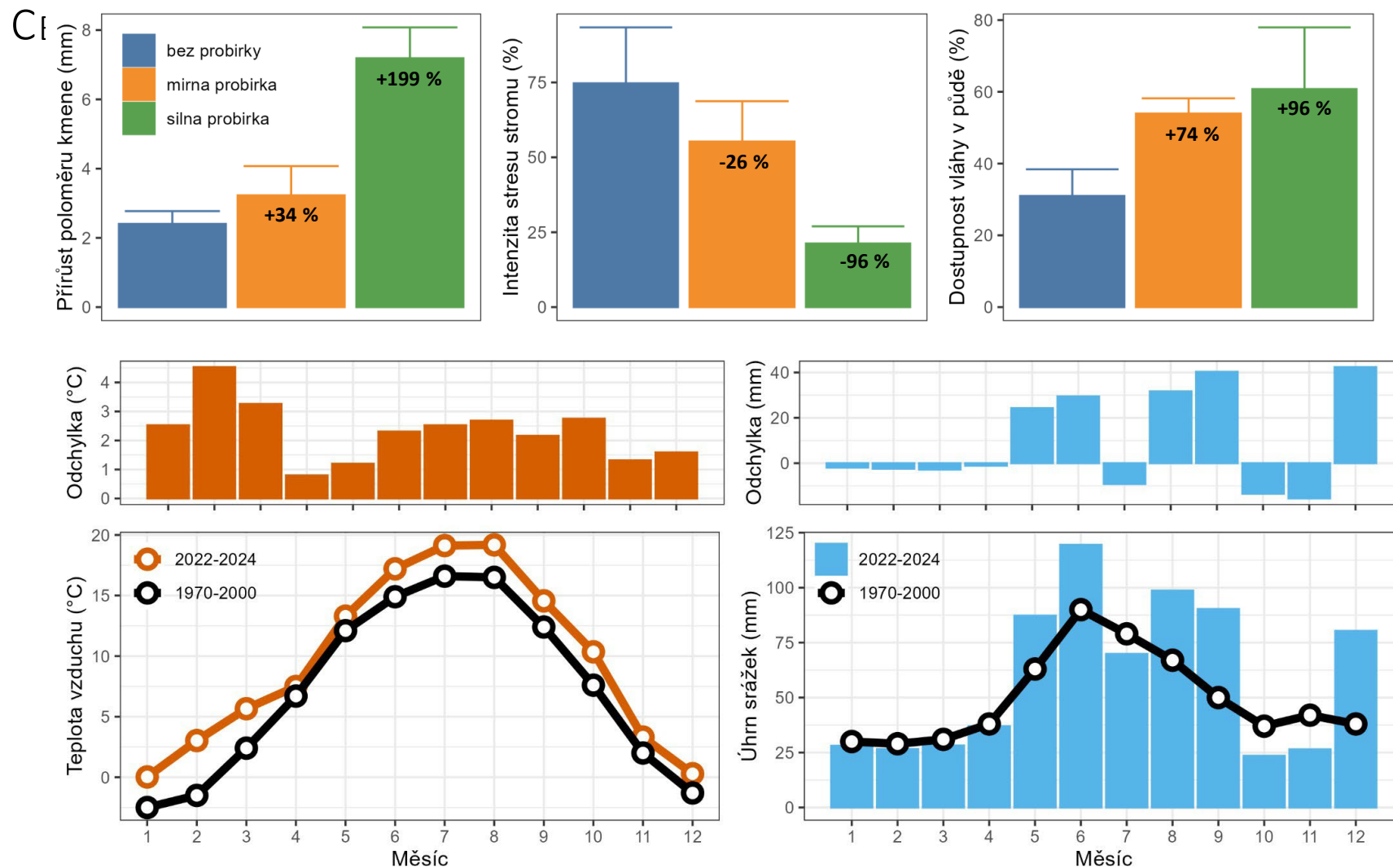
53%

1 competitive tree out

2 competitive trees out

3 competitive trees out

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Source: Plichta R., Gebauer R. et al., not published yet

2 - STAND SCALE



Regular
Continuous cover
The same neighbors

CTNF ideal:
trees do not have the
same neighbor
- according to more
variables



Irregular
Close-to-nature
Variable neighbors

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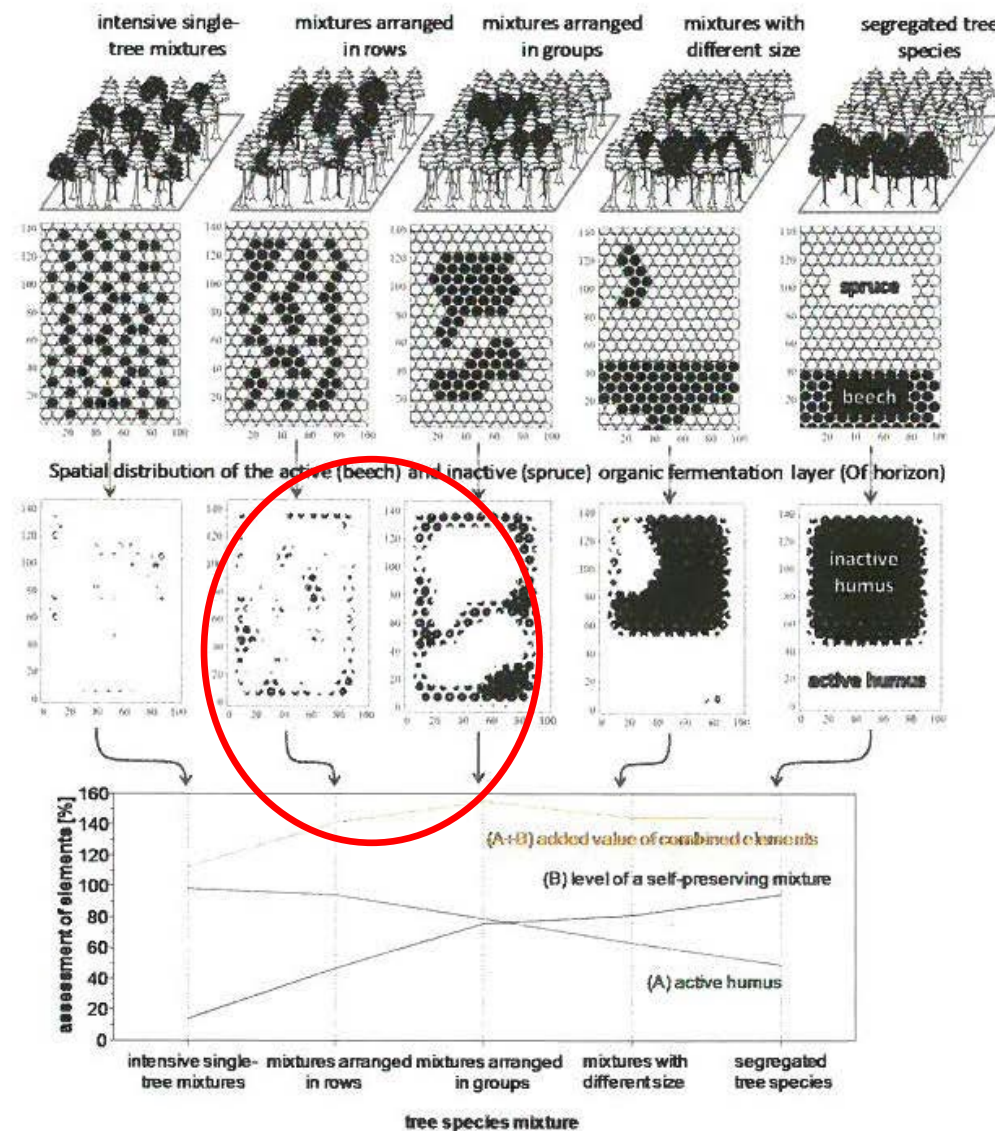
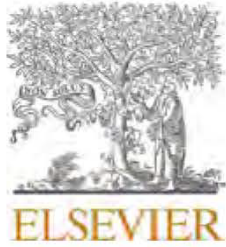


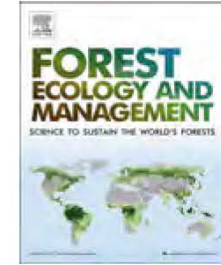
Figure 18. Different spatial arrangements of a beech (30%) and spruce (70%) mixture leads to different proportions of area with an active organic fermentation layer at the forest stand level and to different intensities of tending necessity for preserving the mixture due to unbalanced competition.



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco



Are uneven-aged forests in Central Europe less affected by natural disturbances than even-aged forests?

Johannes Mohr^{a,*}, Dominik Thom^{a,b}, Hubert Hasenauer^c, Rupert Seidl^{a,d}

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^d Berchtesgaden National Park, Doktorberg 6, 83471 Berchtesgaden, Germany

Uneven-aged / Irregular / diversified forests (single selection system or Dauerwald system):

- the level of disturbance by adverse effects was 31.3% lower
- disturbance events had a 36.3% lower frequency (return rate)
- the maximum size of disturbed areas was 15.7% smaller than in even-aged unified stands.

RESEARCH ARTICLE

Competition-induced tree mortality across Europe is driven by shade tolerance, proportion of conspecifics and drought

Niko Kulha¹ | Juha Honkaniemi¹ | Julien Barrere² | Susanne Brandl³ |
Thomas Cordonnier^{2,4} | Kari T. Korhonen¹ | Georges Kunstler² | Carola Paul^{5,6} |
Björn Reineking² | Mikko Peltoniemi¹

Journal of Ecology



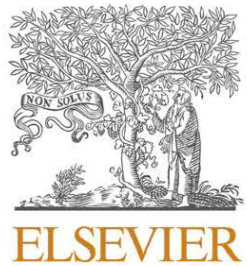
In general:

- to plant mixed stands at the level of individual interspecies mixing
(trees does not have the same neighbor)
- to plant species with a greater amplitude of light/shade tolerance
- to work with lower number of trees that will have large crowns (they will not be suppressed)

3 – LANDSCAPE SCALE



photo: Jana Kloučková Kudrnová



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon



Perspective

Management diversity begets biodiversity in production forest landscapes

Rémi Duflot^{a,b,*}, Lenore Fahrig^c, Mikko Mönkkönen^{a,b}

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^c Geomatics and Landscape Ecology Research Laboratory, Department of Biology, Carleton University, Ottawa, Ontario, Canada

- biodiversity protection and promotion is often adored without economic context
- it can be linked = habitat matrix + spatial diversification of silvicultural systems
- uneven-aged silvicultural systems can increase increment - partial compensation of the increment loss for the biodiversity matrix

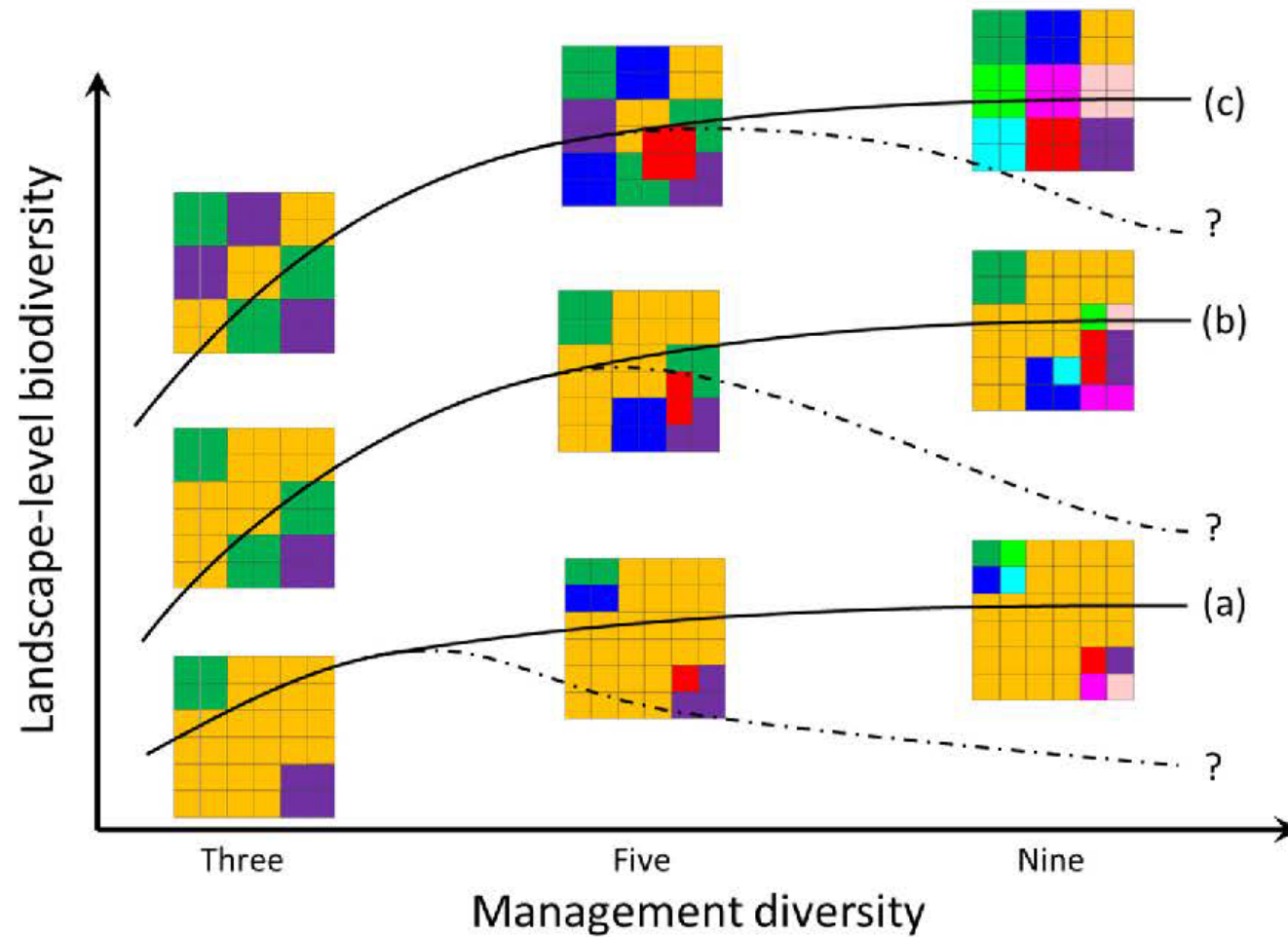
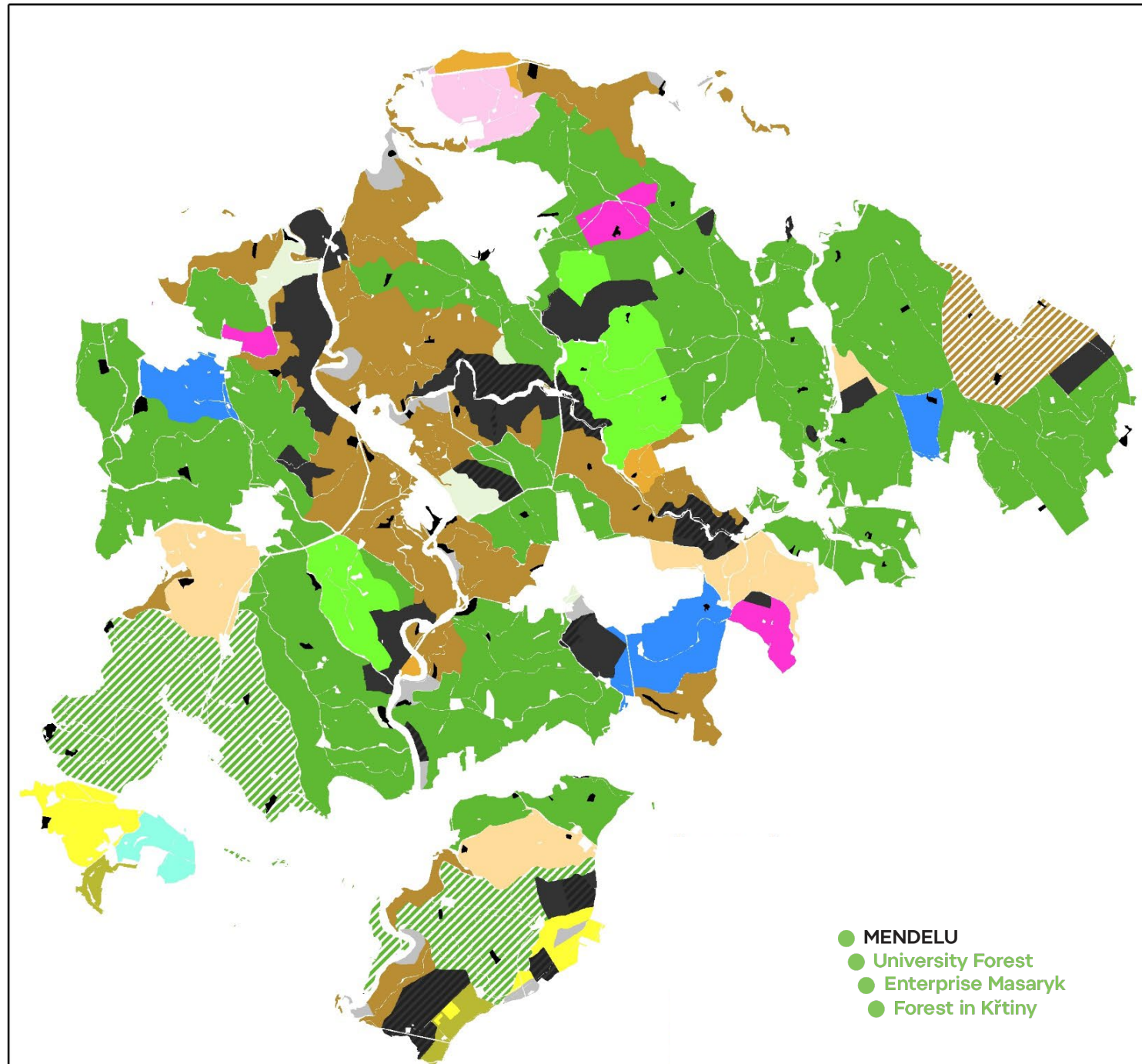
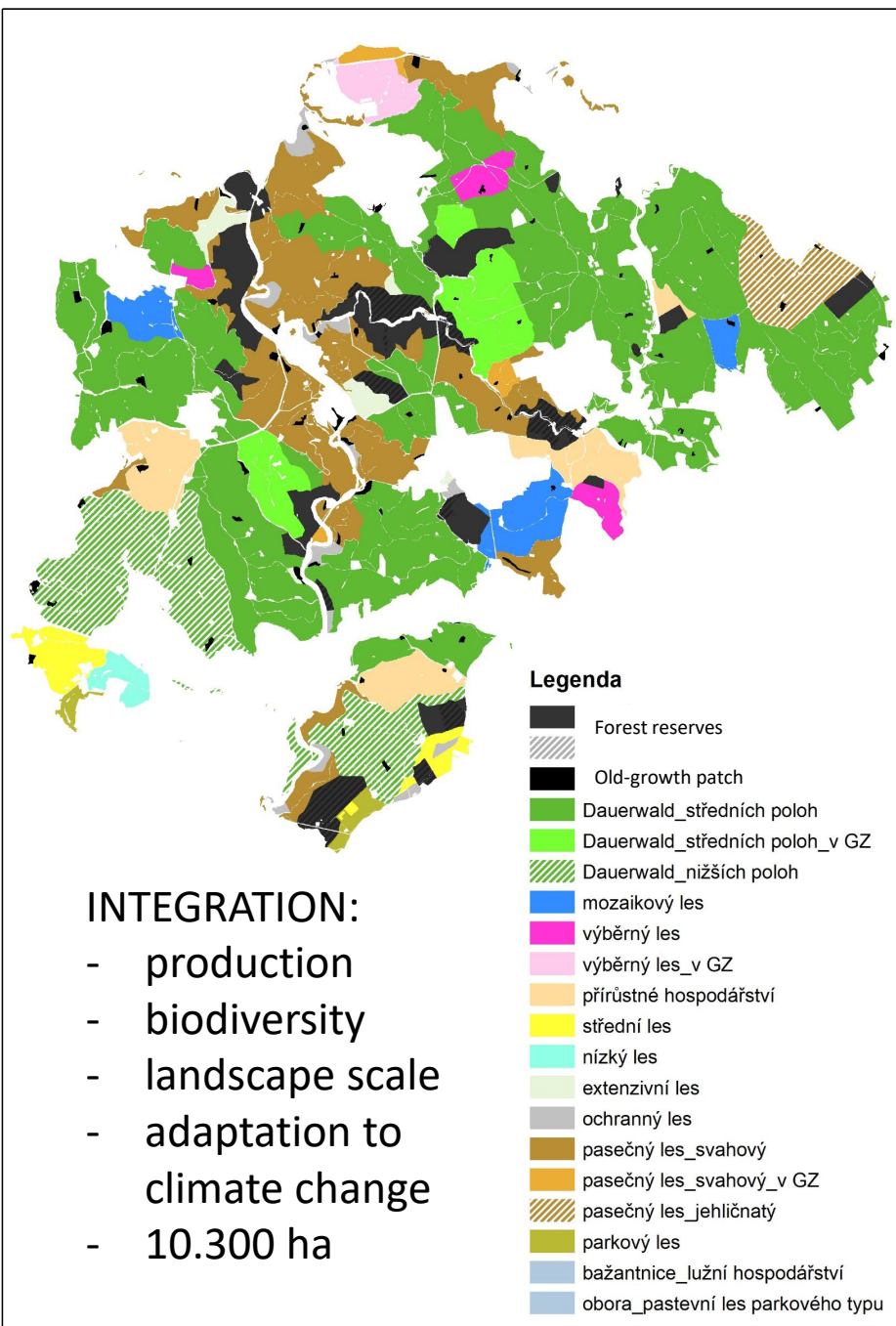


Fig. 1. Landscape-scale (gamma) biodiversity as a function of management diversity at (a) low, (b) intermediate, and (c) high evenness (in proportion of area) among management regimes. Hypothetical landscapes show examples with three, five or nine management regimes. At a constant level of management diversity, an increase in evenness among management regimes increases species diversity. As different forest management regimes are suitable for different species, increased diversity of management regimes at a landscape scale should increase overall biodiversity. However, beyond a certain threshold the area-heterogeneity trade-off could lower the benefits of management diversity (dashed line), especially when management is highly uneven (a) – see Discussion [Section 3.1](#).



Production + biodiversity = integration

Triple „R“ concept: reserve – retain - restore

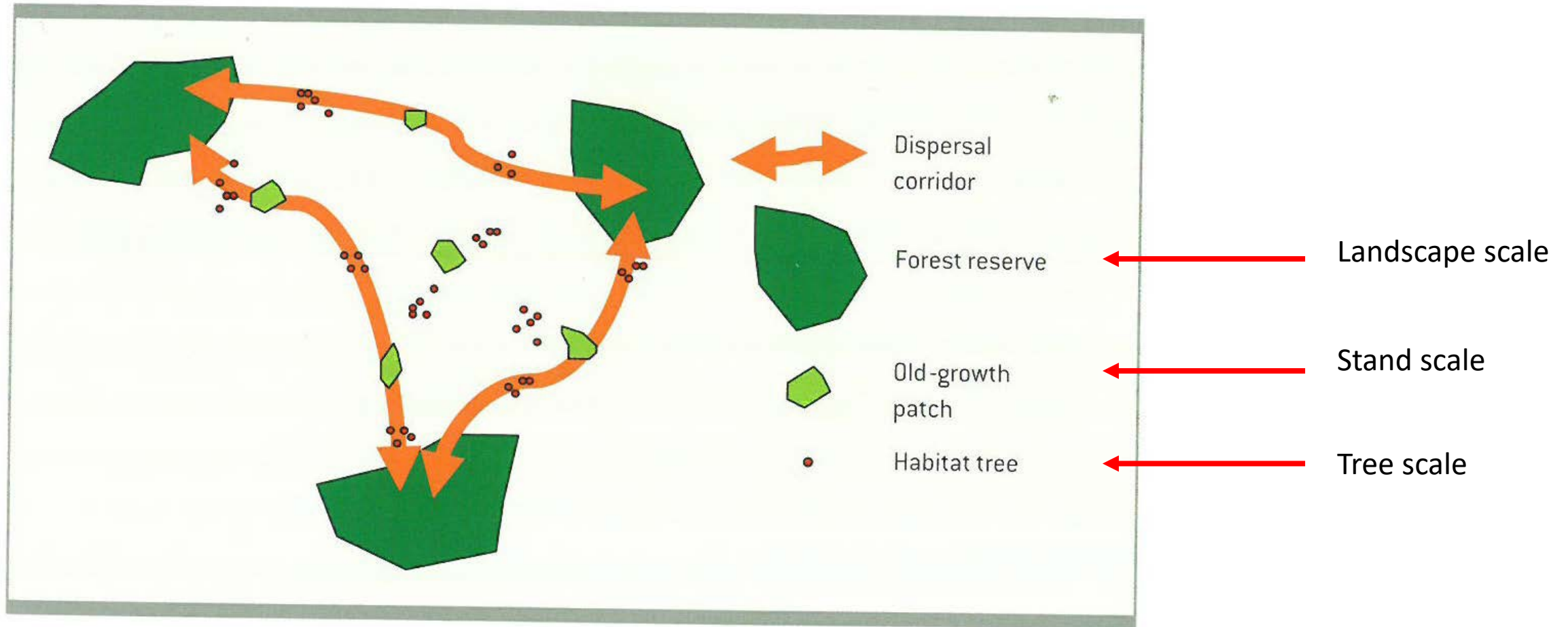


Figure 30. Schematic representation of a functional network of old-growth elements: larger set-asides [reserves >10 ha] are interconnected through set-aside patches [1–5 ha] and individual habitat trees. Areas with higher densities of habitat trees can form “corridors”, but a qualitative “matrix” can also be crossed by most target species. Source: Lachat and Bütler 2007.

WHO can change the state of European forest ? Pro Silva members – experienced practitioners in CTNF



3 conditions for change:

WANT = change the mind

CAN = owner's decision and approval

BE ABLE = to know how to do it

Long-term process:

- theoretically lessons
- practical presentations in the field
- practical education on the training plots
- first change in the stands managed by me
- broader practical applications
- first results need min. 20 years



TAKE HOME MESSAGE FOR PRACTITIONERS



Climate change:

- to work with lower number of trees per ha
- spatial structure of stands is more important than the species composition (it is important too at second)
- theoretical ideal forest: no tree has the same neighbor

Silvicultural models:

- to work with matrix of more systems according to local site conditions (clever yield)
- exactly defined systems, procedures – be able to distinguish differences
- uneven-aged (close-to-nature) systems should prevail

Landscape complexity – integrated forestry:

- biodiversity – 3 levels of scale: forest reserves – stepping stones – habitat trees
- to combine the productive systems in the space
- Forest management planinf according to control method (no age-class method) to combine with control of wild game damages

A photograph of a dense forest. The scene is filled with tall, slender trees, likely deciduous, with their canopies forming a thick layer of green leaves. Sunlight filters through the foliage, creating dappled light on the forest floor. The ground is covered with a dense layer of green undergrowth, including various shrubs and grasses. The overall atmosphere is one of a healthy, mature forest.

more IRREGULARITY brings higher RESILIENCE

it needs high educated foresters and workers who lived in countryside



Full Members

Pro Silva in the year of 2022 has 22 full members within Europe. Behind each flag you can find faces that represent the individual organisation and also some basic facts about them. Hit the flag or the countries name !



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Pro Silva Wallonie



Pro Silva Croatia



Pro Silva Bohemica



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Pro Silva Finlandia



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Pro Silva Portugal



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Pro Silva Slovenia



Pro Silva España



ProSilva Switzerland



Cont.Cover Forestry Grp.(CCFG)





- More than 5500 members, practitioners dominate
- Foresters on all types of property (private, communal, state...)
- „Pro Silva is the club of dot-makers“
- Volunteers only
- 22 national branches

EDUCATION + KNOWLEDGES SHARING

- Exemplary Forests = 100 ha+ **landscape scale**
- Reference stands = 5 ha+
- Training plots – operational data, Martelloscopes
- Combinations on one property

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ANW-Beispielbetriebe

EXEMPLARY FORESTS - GERMANY



Karte

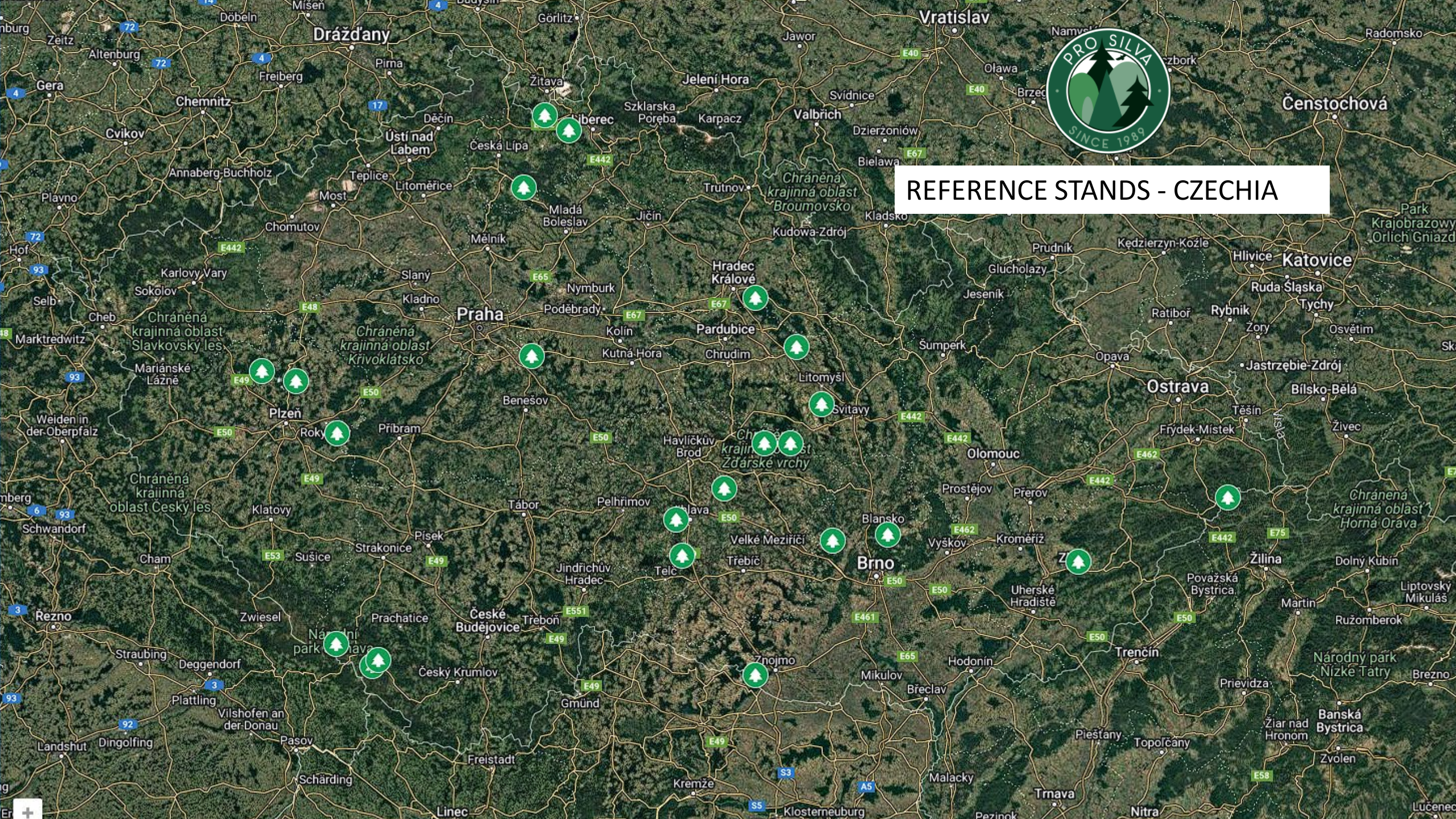
Übersicht

Details





REFERENCE STANDS - CZECHIA





Silviculture—More Complex Than Ever

Klaus J. Puettmann¹ · Anthony W. D'Amato² · Michael Dockry³ ·
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Received: 25 March 2024 / Accepted: 15 August 2024

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Abstract

Silviculture is the central discipline of forestry. It has always been influenced by changes in social and environmental conditions. Much has been accomplished in terms of advancing silviculture, including the culture, scope, and the goals and values it supports. However, we see that trends that initiated or strengthened during the last three decades are not well reflected in the current definition and this provides a barrier for further progress. Such trends include global change, an increased diversity of landowners and associated management goals, expectations of people with a wide range of values, and an acceptance of different ways of knowing. In this context, we see the benefit of providing a more holistic view. Thus, we propose to define silviculture as the “art and science of supporting and stewarding forest and woodland ecosystems and their ability to adapt in order to foster the diverse values of forest’s contributions to people, including landowners, rights holders, communities and society”. We discuss this proposed definition, specifically how it can lead to increased flexibility in silvicultural decisions, which can reflect a higher diversity of values and strengthen the adaptive capacity of forests. Furthermore, we discuss how addressing these trends requires a change in education.

Many questions for the future:

- new data from reality needed
- assisted migration?
- invasive species management
- nature conservation paradigm
- changing social expectations
- hunting as the problem
- forester’s communication
- Etc.



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ECOSYSTEM SERVICES OF RESILIENT LANDSCAPES

drinking water - family picnic - cool shade in summer - biodiversity - mushrooms, raspberries, herbs for tea -
permanent production potential of soils without chemical residues and erosion - jogging - scout expedition -
cycling ride - wheelchair accessibility - staying outdoors during COVID restrictions - refreshing in the water -
walk of lovers - spiritual moments

?

free? at the expense of the forest owner?

and how will farmers contribute?





PRO SILVA – ready to share our practical knowledges across Europe and to support resilient landscapes

<https://www.prosilva.org/>

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UFE MENDELU – ready to present practical solution in the field and to offer practical training

<https://www.slpkrtiny.cz/>



photo: Jana Kloučková Kudrnová

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