An Integrated Forest Management Approach for More Effective Natural Resource Governance

„How to link forest yield with biodiversity support in an era of global climate change“

Tomáš Vrška, Pro Silva president

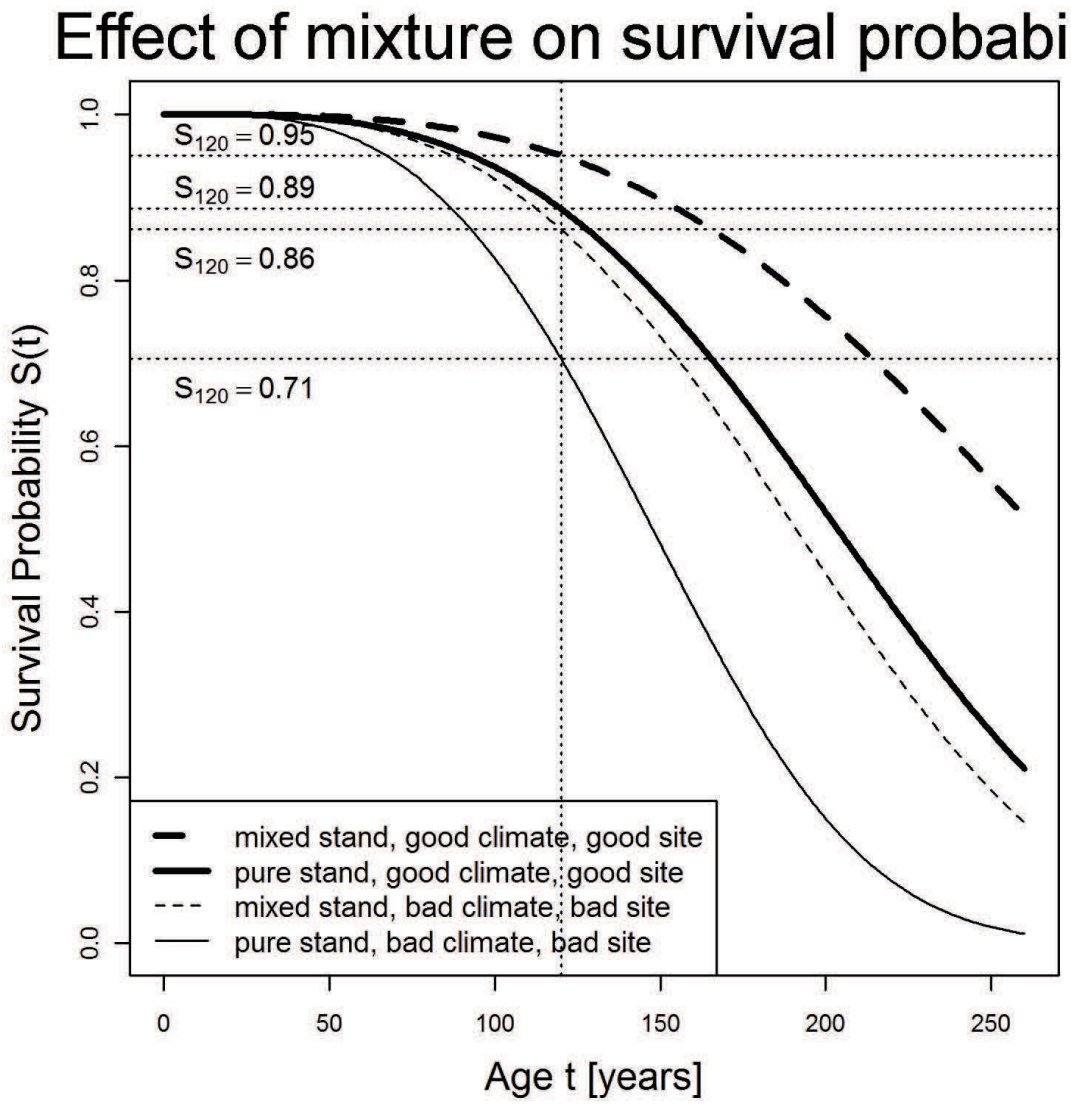
Riga, September 18th, 2025

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?



Neuner et al. 2014. Global Change Biology 21: 935-946

European perspective

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?

C O N C E P T S – science + policy

continuous cover forestry

retention forestry

closer-to-nature forestry (EU 2030)

close-to-nature forestry

natural disturbance-based forest management

ecological forestry

„even-aged“ „regular“ principle

stand care
forester‘s intervention

natural processes
selected (or target) trees
care

„uneven-aged“ „irregular“ principle

even-aged clear-cut model

shelterwood multi-aged model

coppice with standards

mosaic forest

value increment silviculture

Dauerwald

single selection model

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M O D E L S - practice

Vrška T. et al. 2025

Four big questions:

1 How to adapt current stands?

2 How to manage new forest stands in succession after the calamities?

3 How to connect everything into a functional system on the landscape scale?

4 Who can change the state of European forests?

frontiers | Frontiers in Forests and Global Change

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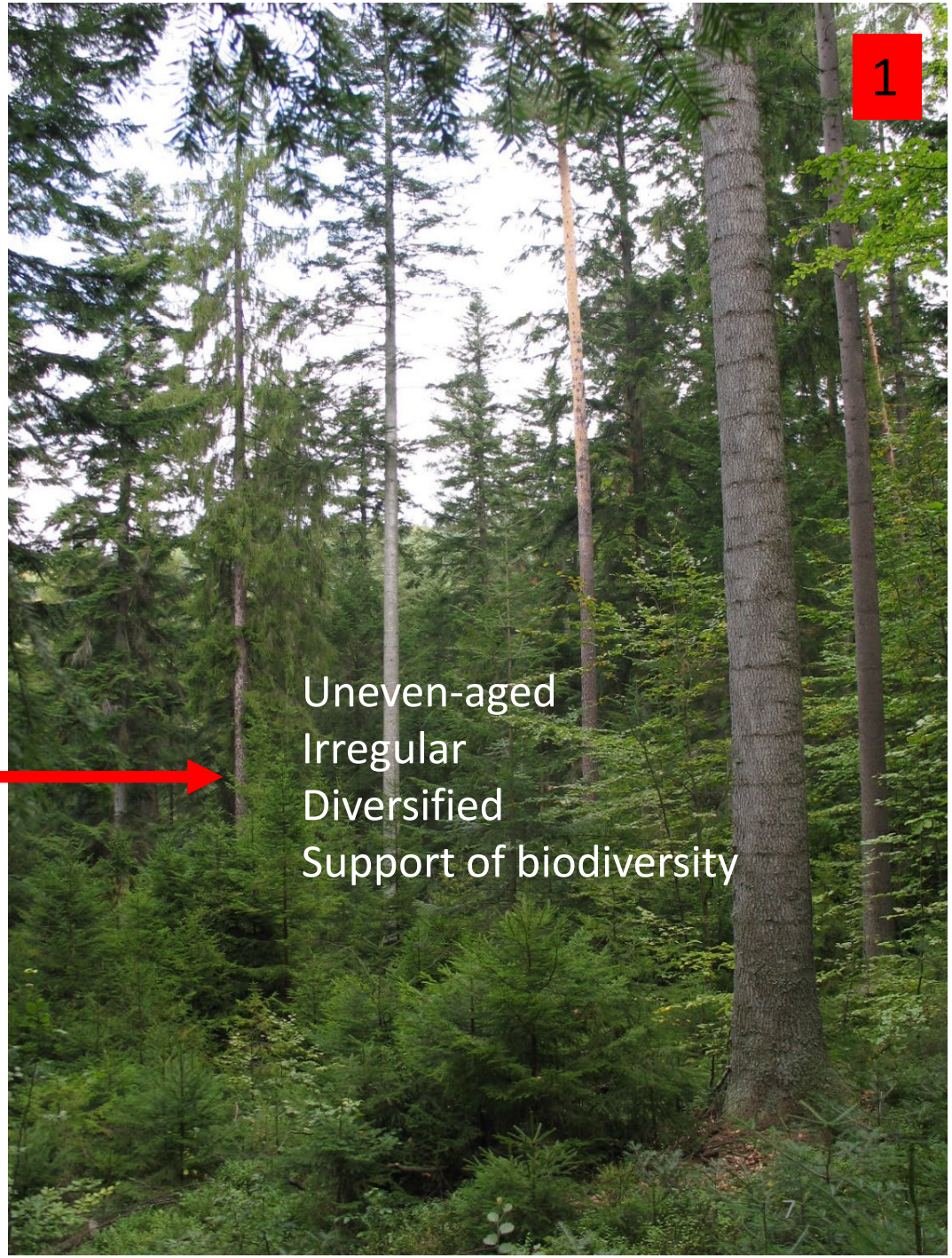
Stand structure is more important for forest productivity stability than tree, understory plant and soil biota species diversity

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 !!!


Even-aged
Regular
Unified
Loss of biodiversity


1
Uneven-aged
Irregular
Diversified
Support of biodiversity

Three big questions:

1 How to adapt current stands?

2 How to manage new forest stands in succession after the calamities?

3 How to connect everything into a functional system on the landscape scale?

4 Who can change the state of European forests?

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RESEARCH ARTICLE

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

Niko Kulha[1] | Juha Honkaniemi[1] | Julien Barrere[2] | Susanne Brandl[3] | Thomas Cordonnier[2,4] | Kari T. Korhonen[1] | Georges Kunstler[2] | Carola Paul[5,6] | Björn Reineking[2] | Mikko Peltoniemi[1]

Journal of Ecology | BRITISH ECOLOGICAL SOCIETY

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)


Regular
Continuous cover


Irregular
Close-to-nature

Irregularity – in number of trees per ha, intensity of thinning, patches creation…

Three big questions:

1 How to adapt current stands?

2 How to manage new forest stands in succession after the calamities?

3 How to connect/integrate everything into a functional system on the landscape scale?

4 Who can change the state of European forests?

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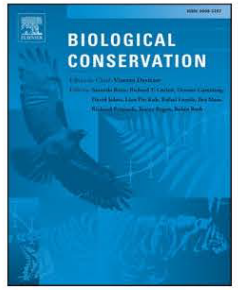

Perspective

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 models
- uneven-aged silvicultural models can increase increment - partial compensation of the increment loss for the biodiversity matrix

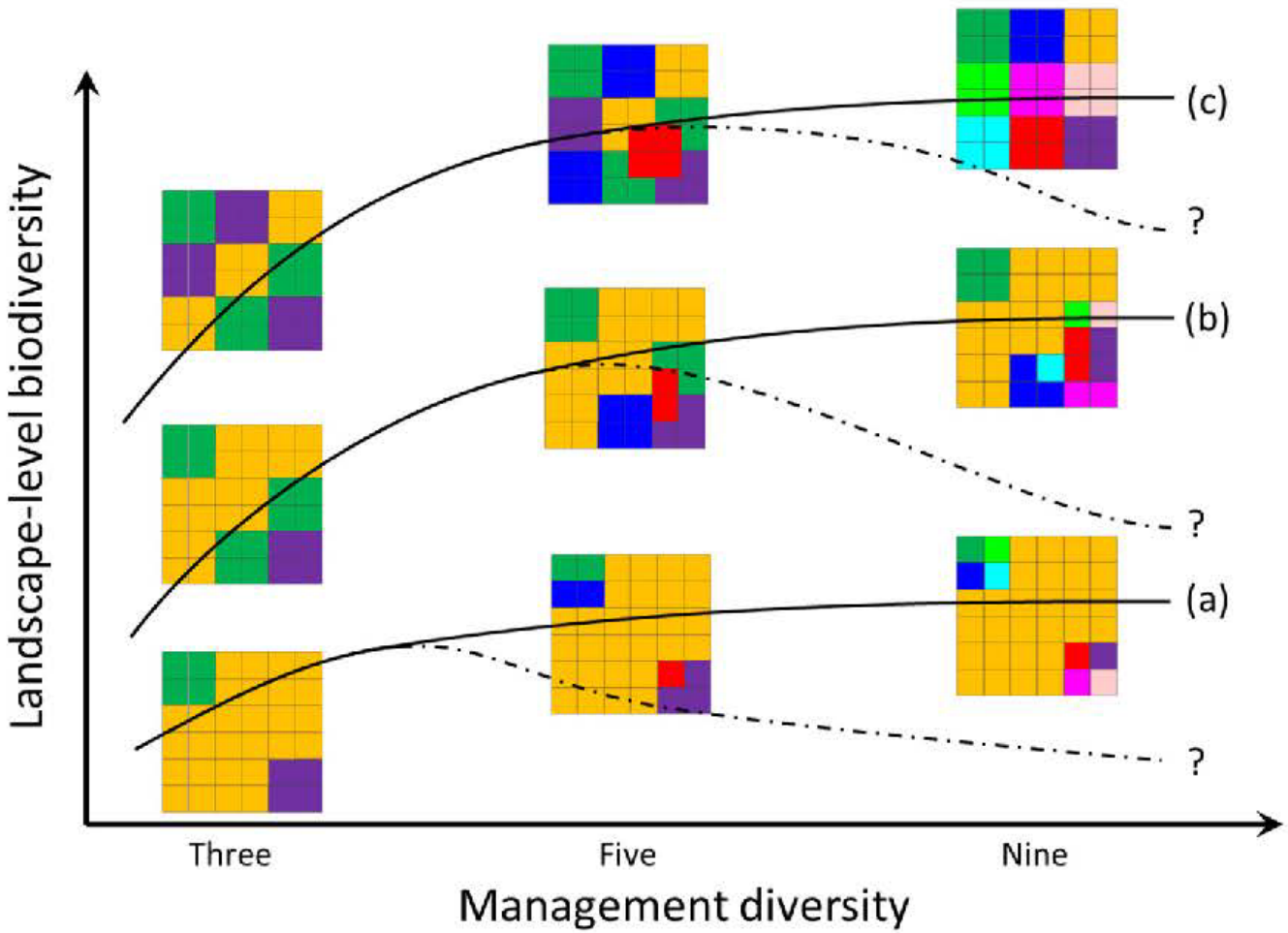

Fig. 1. Landscape-scale (gamma) biodiversity as a function of management diversity at (a) low, (b) intermediate, and (c) high evenness (in proportion of area) among management regimes. Hypothetical landscapes show examples with three, five or nine management regimes. At a constant level of management 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.


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FIN
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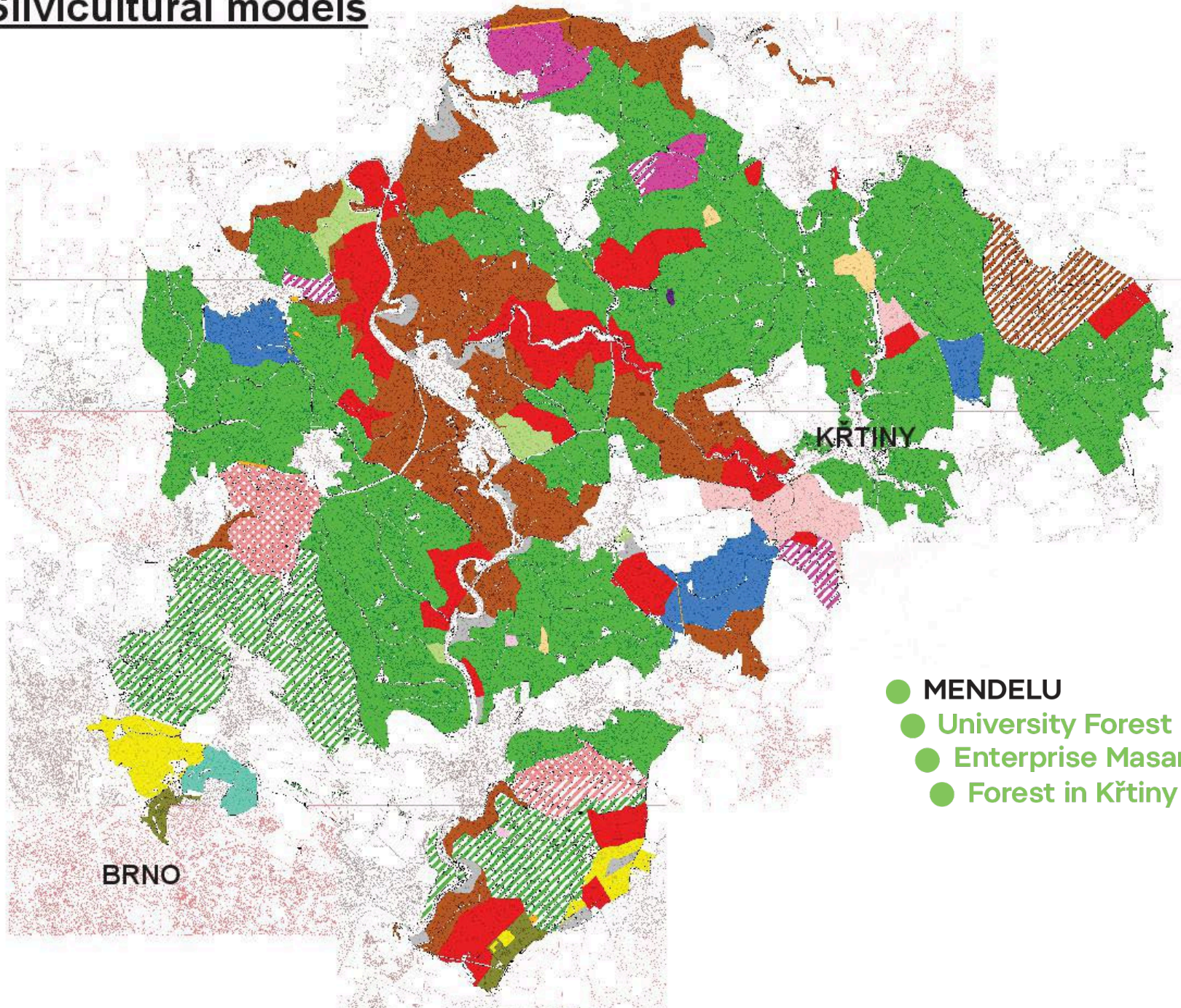
GRC

Silvicultural models



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  - Forest in Křtiny

Legend

- Uneven-aged "Dauerwald"_beech-spruce-larch (45%)
- Uneven-aged "Dauerwald"_oak-pine (9%)
- Mosaic forest_beech and oak (3%)
- Selection forest_fir and spruce (2%)
- Selection forest_beech (1%)
- Value increment silviculture_beech (2%)
- Value increment silviculture_oak (1%)
- Value increment silviculture_oak and beech (2%)
- Coppice with standards_oak-hornbeam-lime (2%)
- Coppice_oak-hornbeam-lime (1%)
- Extensive forest_beech-oak-hornbeam (1%)
- Forest with high rotation_beech-larch (0,1%)
- Soil-protected forest_beech-oak-hornbeam (1%)
- Even-aged shelterwood on slope_beech (15%)
- Even-aged shelterwood_conifers (2%)
- Unmanaged forest reserves_broadleaves (8%)
- Christmas trees (0,1%)
- Seed orchard_larch, pine (0,1%)
- Arboretum (0,4%)
- Recreation forest (0,6%)
- Agroforest (0,1%)
- Game enclosure for pheasants_floodplain forestry (1%)
- Game enclosure for deers (0,5%)

Production + biodiversity = integration

Triple „R“ concept: reserve – retain - restore

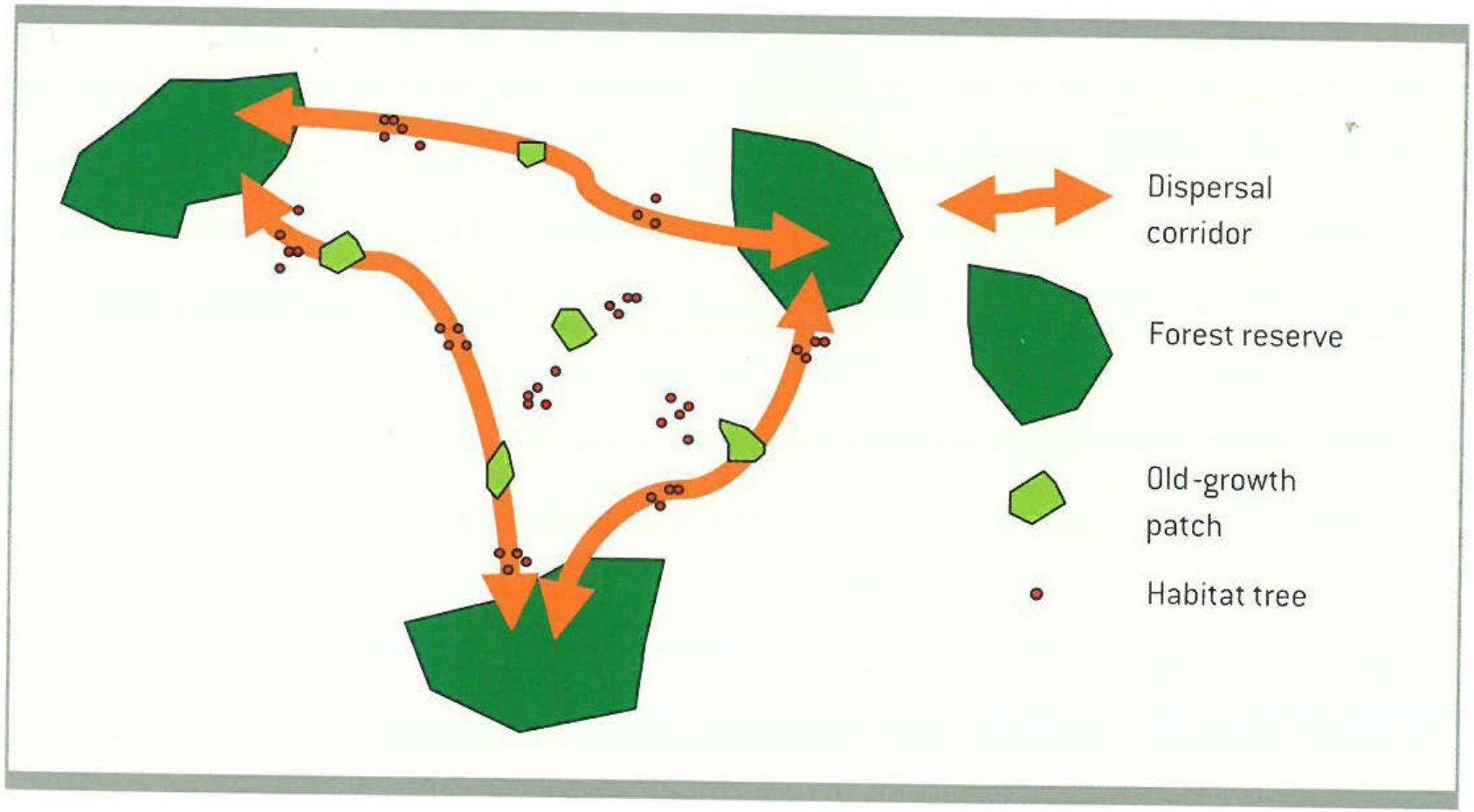
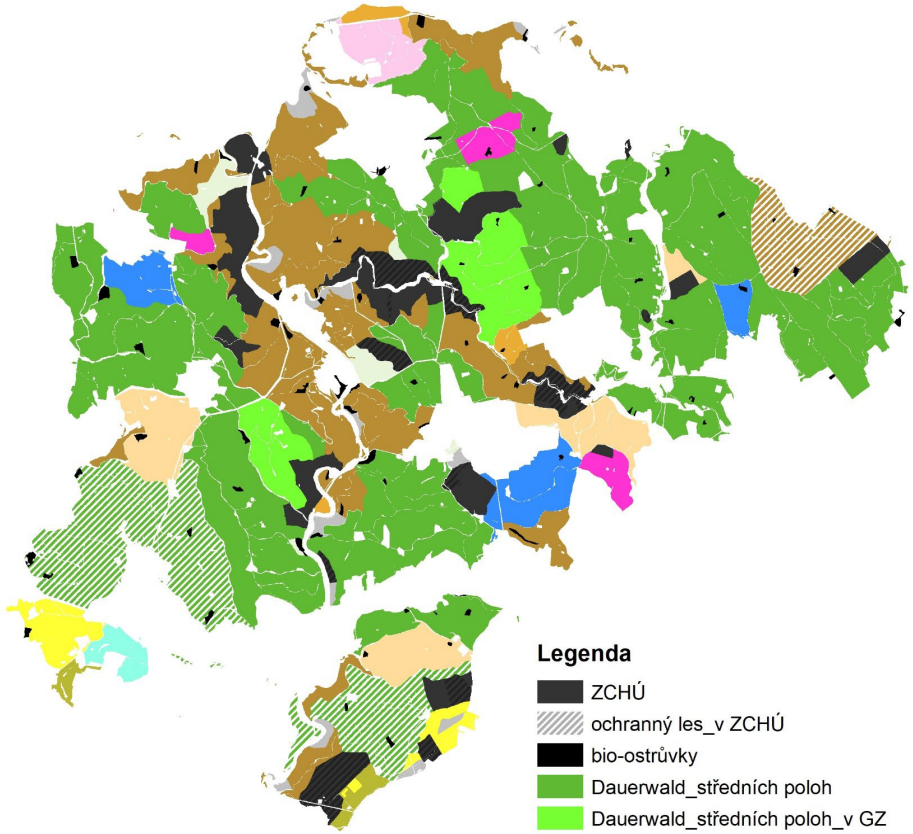


Figure 30. Schematic representation of a functional network of old-growth elements: larger set-asides (reserves >10 ha) are interconnected through set-aside patches (1–5 ha) and individual habitat trees. Areas with higher densities of habitat trees can form "corridors", but a qualitative "matrix" can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

Krumm et Kraus eds. 2014

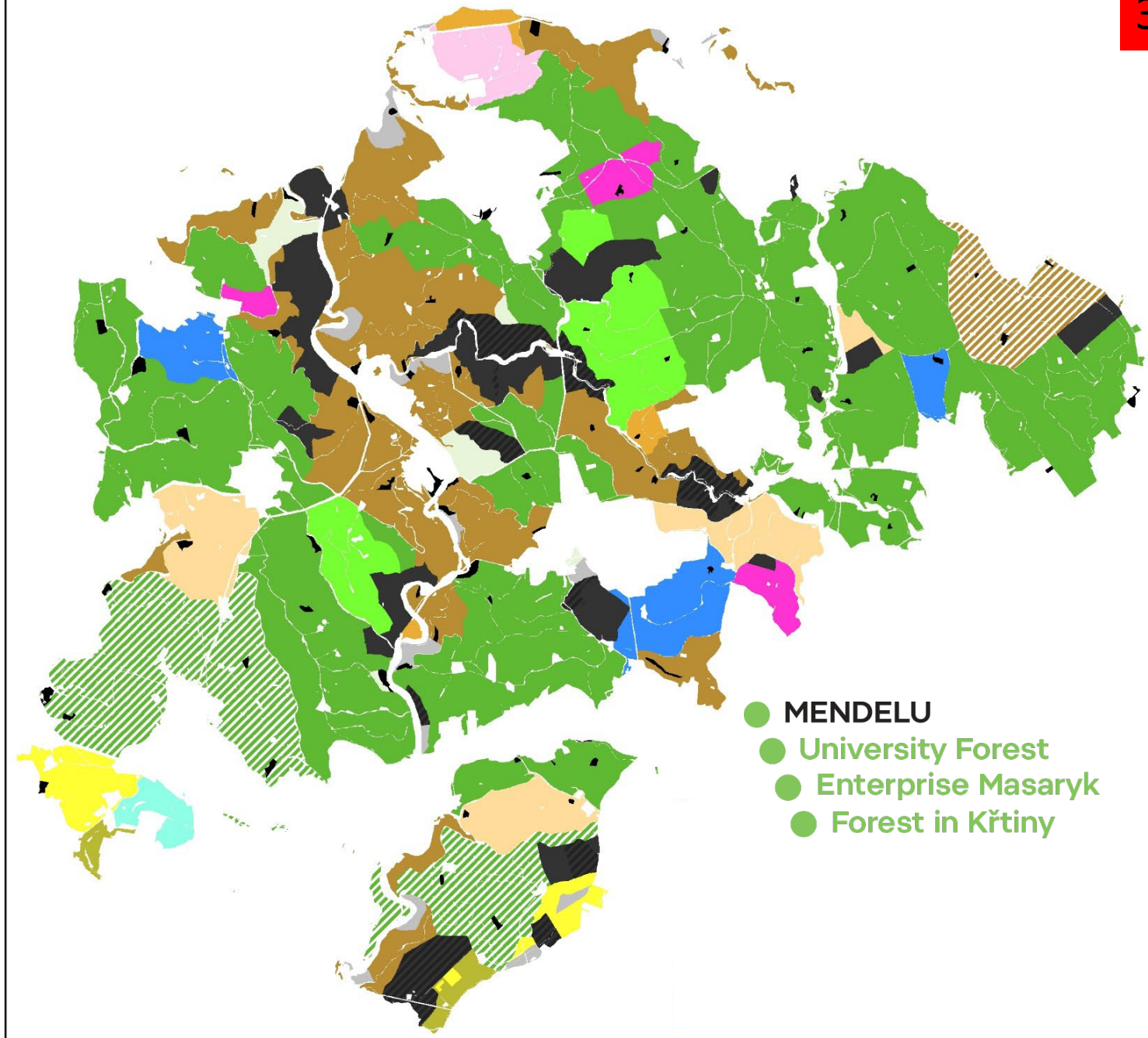


Legenda

- ZCHÚ
- ochranný les_v ZCHÚ
- bio-ostrůvky
- Dauerwald_středních poloh
- Dauerwald_středních poloh_v GZ
- Dauerwald_nižších poloh
- mozaikový les
- výběrný les
- výběrný les_v GZ
- přírůstné hospodářství
- střední les
- nízký les
- extenzivní les
- ochranný les
- pasečný les_svahový
- pasečný les_svahový_v GZ
- pasečný les_jehličnatý
- parkový les
- bažantnice_lužní hospodářství
- obora_pastevní les parkového typu

INTEGRATION:

- production
- biodiversity
- landscape scale
- adaptation to climate change



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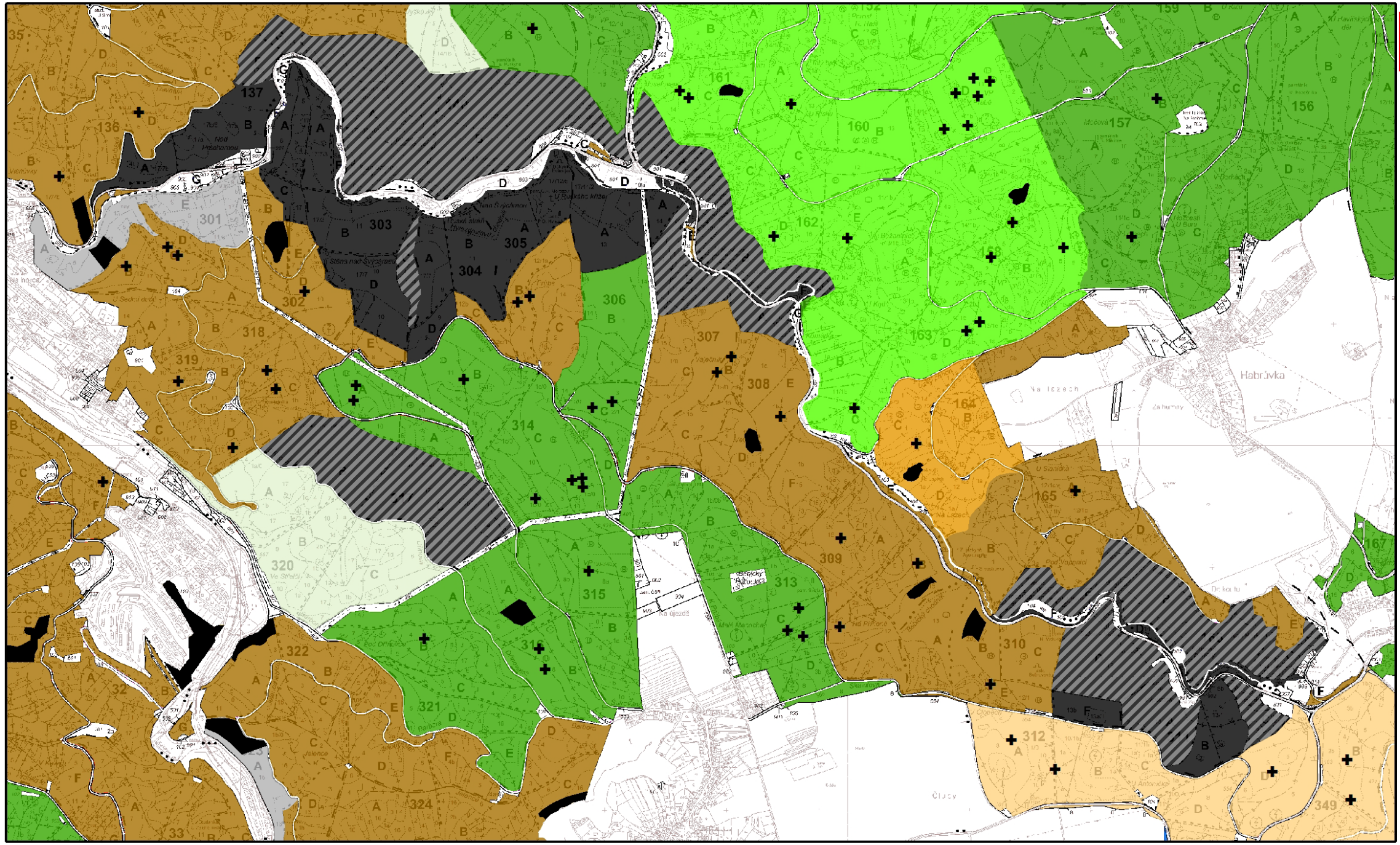

Habrůvka
Čtyry

Three big questions:

1 How to adapt current stands?

2 How to manage new forest stands in succession after the calamities?

3 How to connect everything into a functional system on the landscape scale?

4 Who can change the state of European forests?

WHO can change the state of European Forests - EP, EC, EEA, EFI, Universities, Authorities?

foresters have to: WANT – CAN – BE ABLE (to know how)

forest workers need: qualified foresters, long-term job, regular salary, to return to the same forest stands

It costs a lot of money! Close-to-nature forestry brings the savings!

Close-to-nature forestry =
- to use the more natural power (lower human input) to produce high quality timber continually
- to work with more complex ecosystem – saving biodiversity (more irregularity)
- to work with qualified responsible workers (no other way)

triple WIN strategy – HQ timber / biodiversity support / local people

WANT = change the mind

CAN = owner‘s decision

BE ABLE TO DO IT = to know how to do it

- 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

Noc vědců 2025 na Lesnické a | Noc vědců 2025 na Lesnické a | Překladač Google | Membership | Pro Silva

ers/

Pro Silva | Activities | Close to Nature Forestry | Information & News

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 !


Pro Silva Austria


Pro Silva Wallonie


Pro Silva Croatia


Pro Silva Bohemica


Pro Silva Danmark


Pro Silva Finlandia


Pro Silva France


ANW Deutschland


Pro Silva Greece


Pro Silva Hungaria


Pro Silva Ireland


Pro Silva Italia


Pro Silva Luxemburg


Pro Silva Montenegro


Pro Silva Nederland


Pro Silva Polonia


Pro Silva Portugal


Pro Silva Slovakia


Pro Silva Slovenia


Pro Silva España


ProSilva Switzerland


Cont.Cover Forestry Grp.(CCFG)

- PRO SILVA is a European federation of foresters who advocate forest management based on natural processes.

- PROSILVA promotes forest management strategies which optimise the maintenance, conservation and utilisation of forest ecosystems in such a way that the ecological and socio-economic functions are sustainable and profitable.

We integrate:

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

- More than 5500 members, practitioners dominate
- „Pro Silva is the club of dot-makers“
- Volunteers only
- 22 national branches
- no groups from Baltic states yet!!!

EDUCATION + KNOWLEDGES SHARING

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

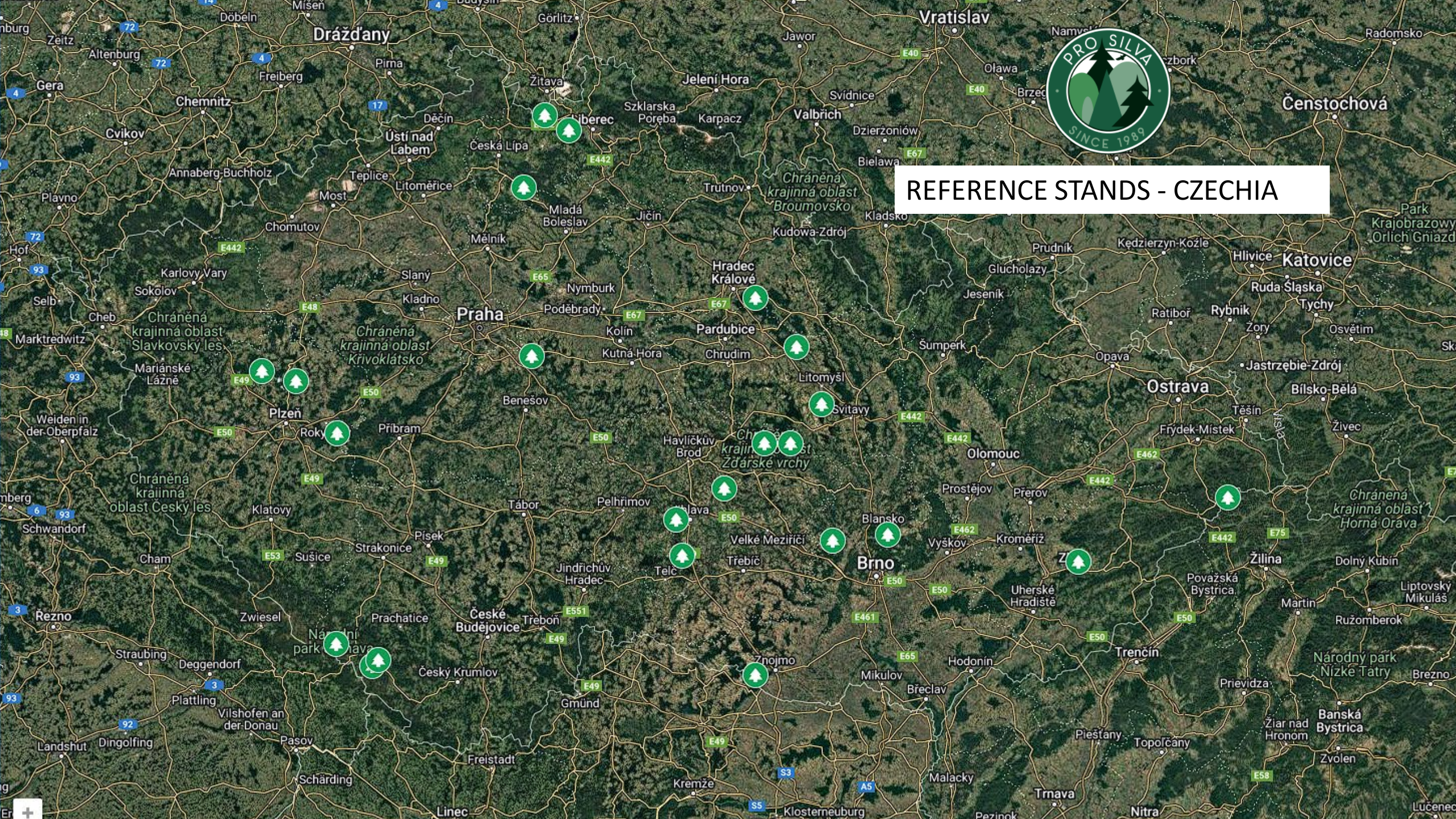
www.prosilva.org

ANW-Beispielbetriebe

EXEMPLARY FORESTS - GERMANY

Karte | Übersicht | Details

REFERENCE STANDS - CZECHIA



Integrated forest management = HQ timber (economy) + biodiversity (resilience) + people (social role)

CTNF practitioners need political and financial support to share the knowledges with other colleagues.

- we know why they are so careful to change the silvicultural models

- we know how to explain the necessity of big change in mind, in daily practice

- we are able to earn their trust

ONLY the motivated „dot makers“ can change the state of forests

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 models according to local site conditions (clever yield)
- exactly defined models, procedures – be able to distinguish differences
- uneven-aged (close-to-nature) models should prevail

Landscape complexity – integrated forestry:

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

Journal of Forestry
https://doi.org/10.1007/s44392-025-00015-2

REVIEW PAPER

Silviculture—More Complex Than Ever

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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.


more IRREGULARITY brings higher RESILIENCE
it needs high educated foresters more than new policy documents