

# **INTEGRATE NETWORK**

**Andreea Spînu,**  
with contributions from  
Jürgen Bauhus  
University of Freiburg,  
Chair of Silviculture

**Protecting  
biodiversity through  
integrative forest  
management**

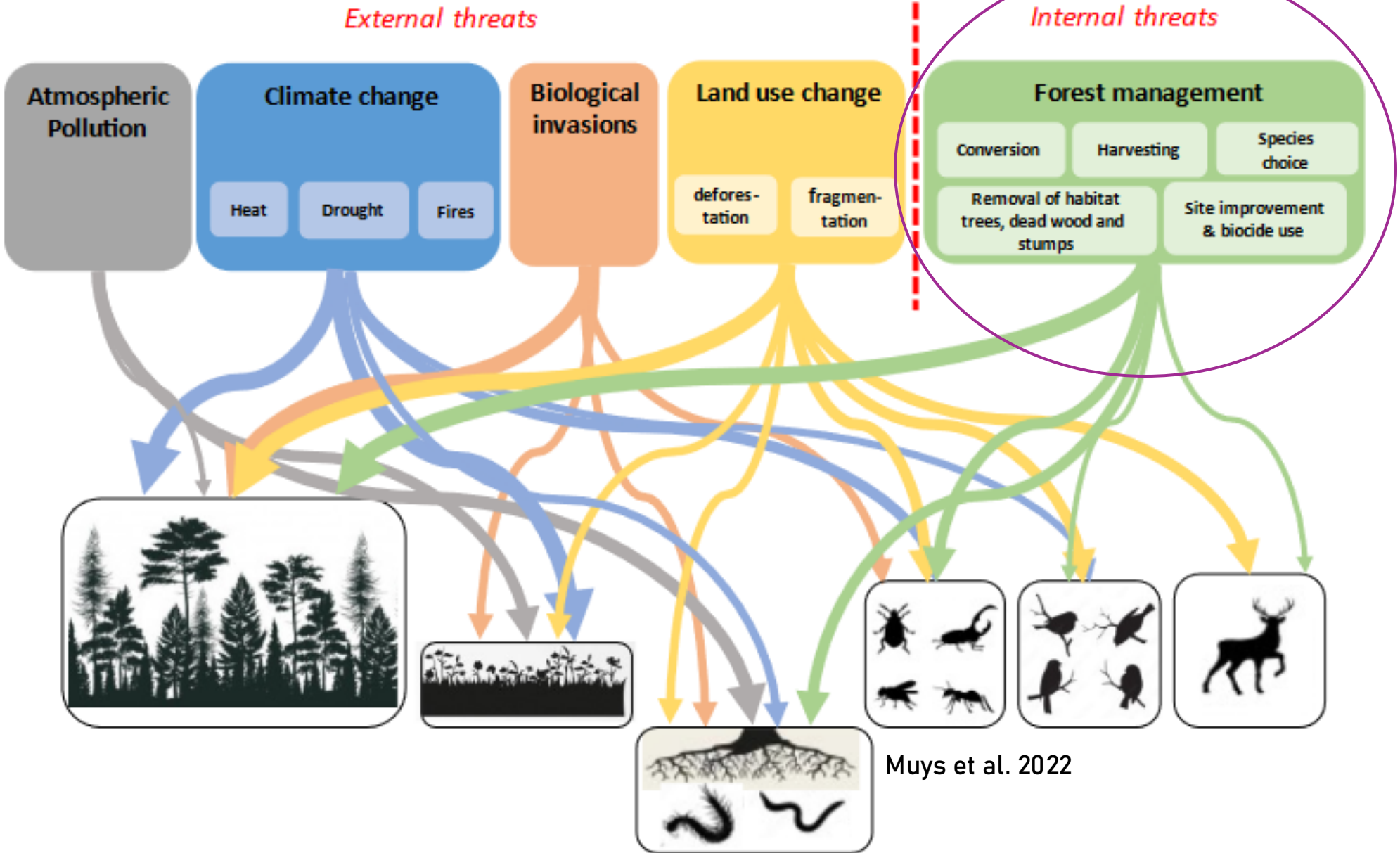
**Forest biodiversity contributes to human well-being** (Piras et al., 2021; Piccolo et al., 2022)

**Promotion of biodiversity in forests fosters their resilience and productivity** (Seidl et al., 2017; Steffen et al., 2016)

**The health of European forests and associated biodiversity are susceptible to significant effects caused by global change** (Dyderski et al., 2018; Hanewinkel et al., 2013)



# Pressures on forest biodiversity



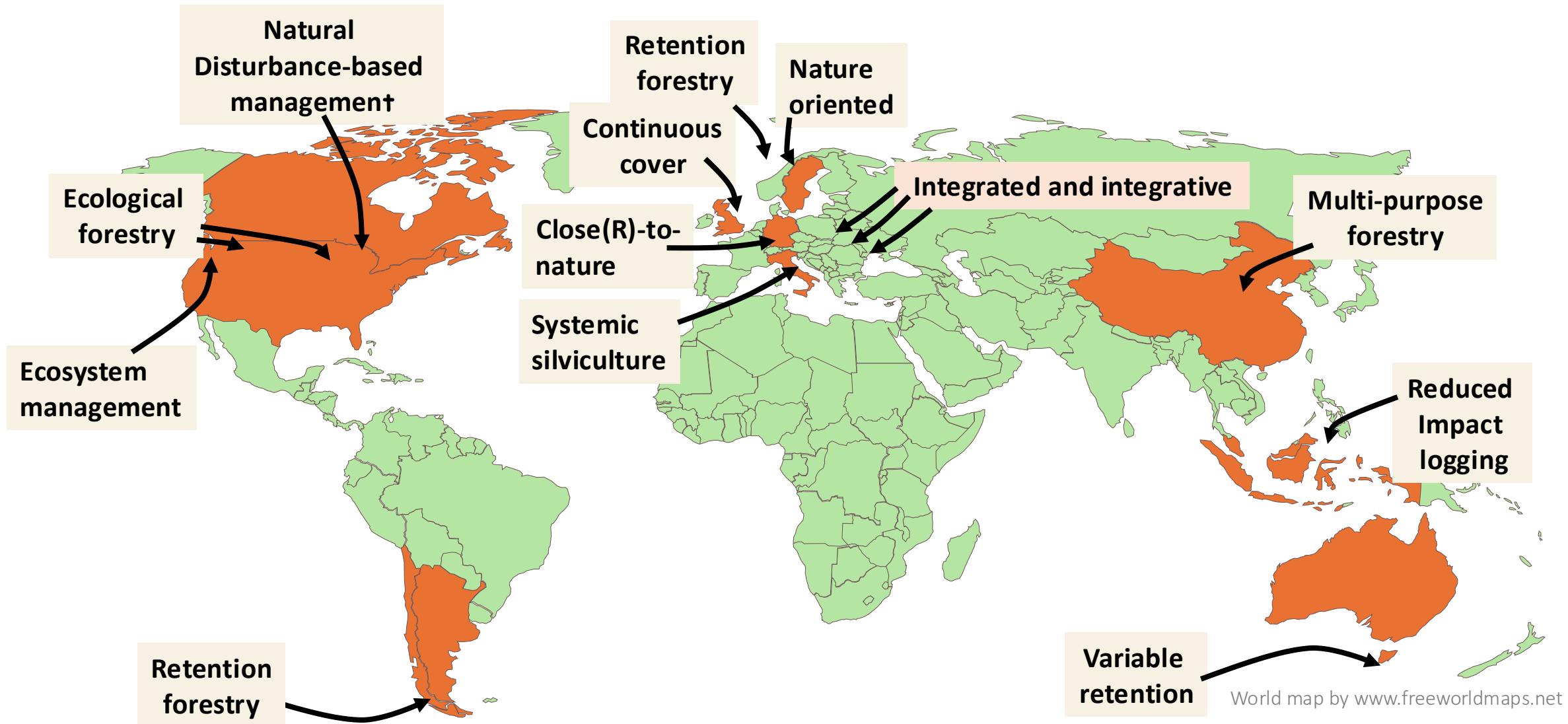
Muys et al. 2022

# What can be and has been done?

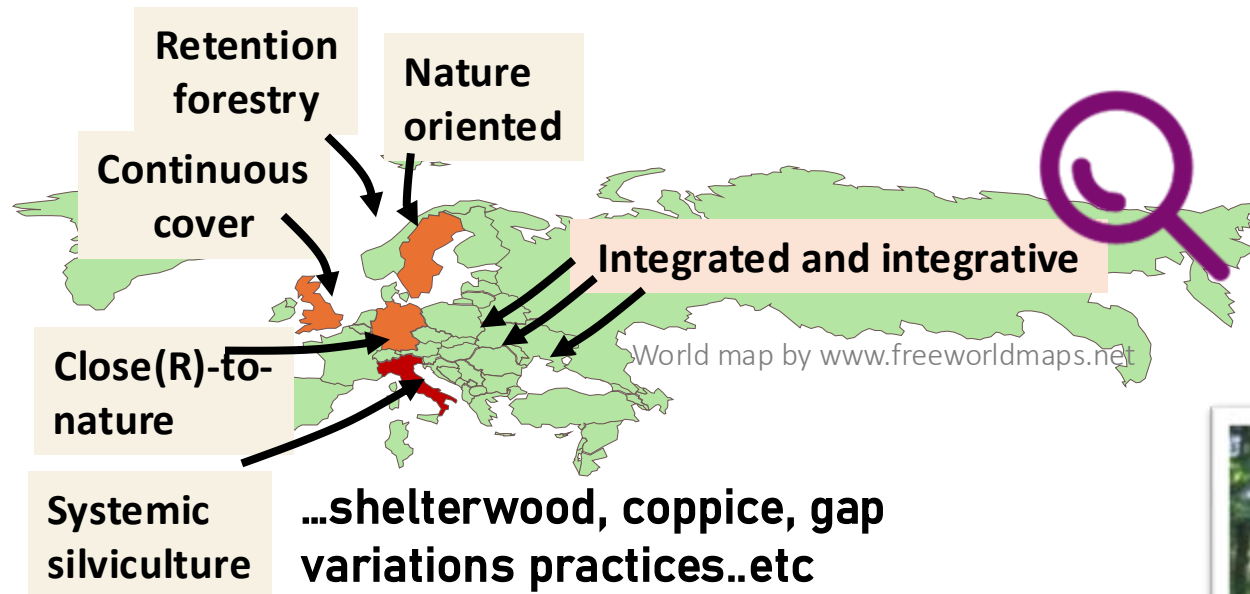


<https://storyset.com>.

# Integrating biodiversity in silvicultural paradigms



# Integrating biodiversity in silvicultural paradigms



**Conserving and promoting forest biodiversity requires a diversity of management approaches and practices:**



# IFM: Integrated and Integrative Forest Management

**Biodiversity conservation**  
**Climate change adaptation**

**Consistently considers the tree, stand and landscape scale.**

**Employs different silvicultural intensities**

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**Biodiversity conservation  
Climate change adaptation**

**Consistently considers the  
tree, stand and landscape  
scale.**

**Employs different  
silvicultural intensities**

**Brings together  
stakeholders to develop  
tailored strategies**

# Integrative Forest Management promotes:..



Retention of habitat trees, special habitats and deadwood



Site-adapted tree species



Natural tree regeneration



Partial harvest and structural heterogeneity



Tree species variation and genetic diversity



Avoidance of intensive management operations



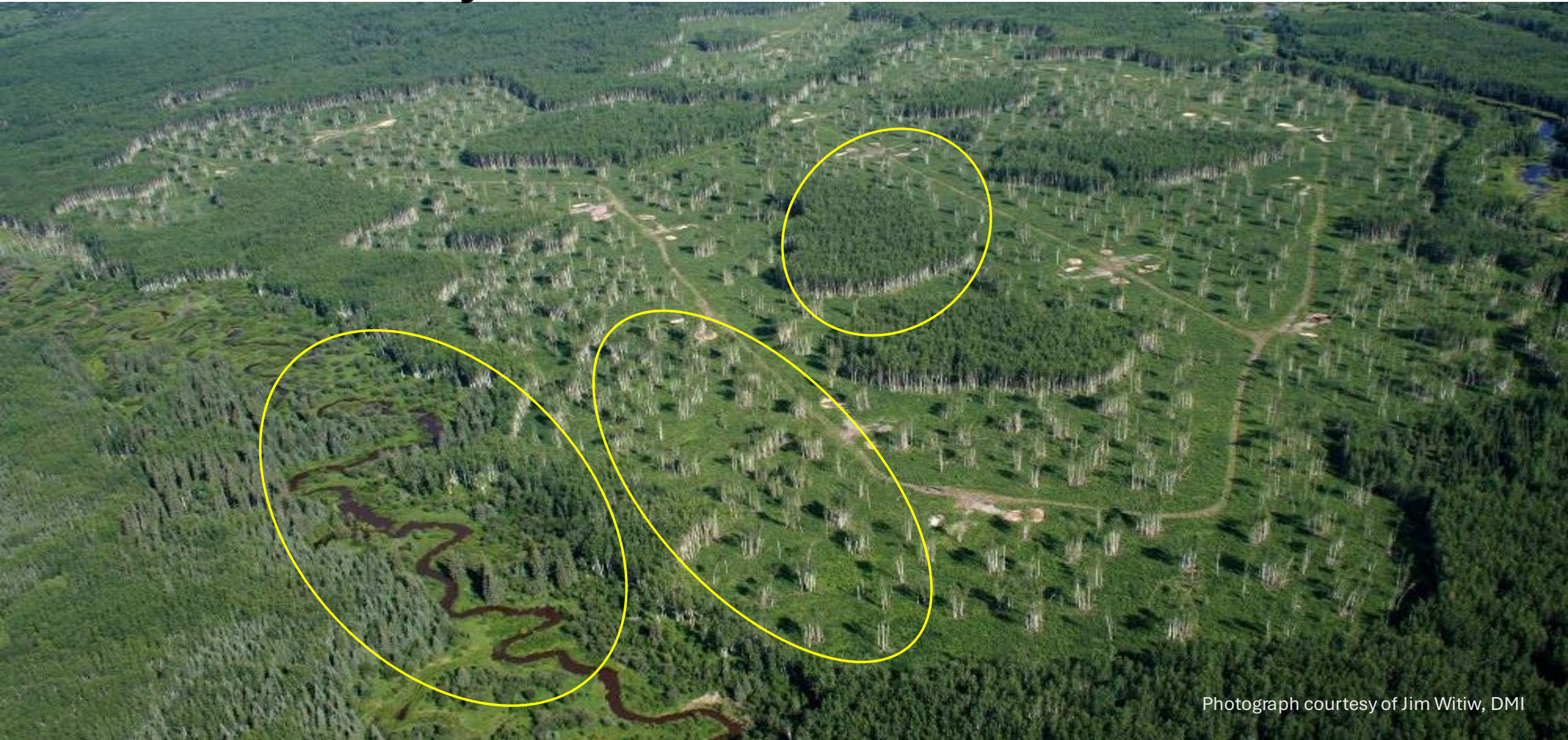
Landscape heterogeneity and functioning



Management of factors that hinder ecosystem functioning

Spinu et al., in prep.

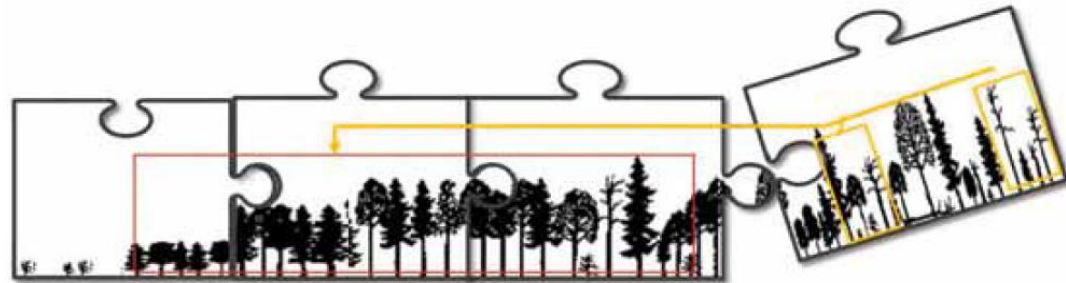
# Retention Forestry



Photograph courtesy of Jim Witiw, DMI



## Retention also required in selection forests

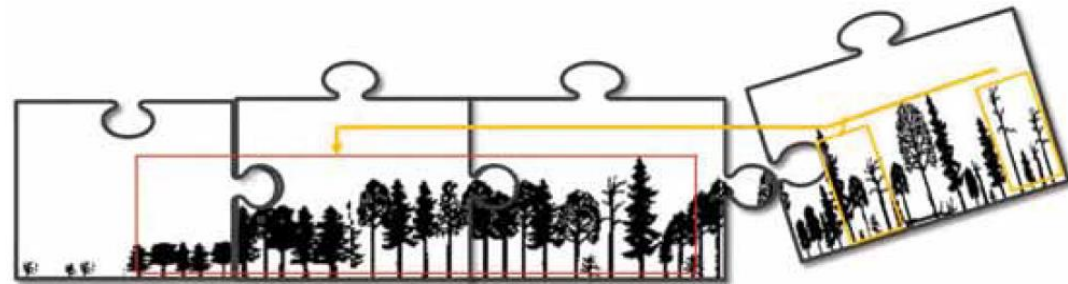


Kraus & Krumm, 2013

**Structural elements of old forest development phases are largely absent.**

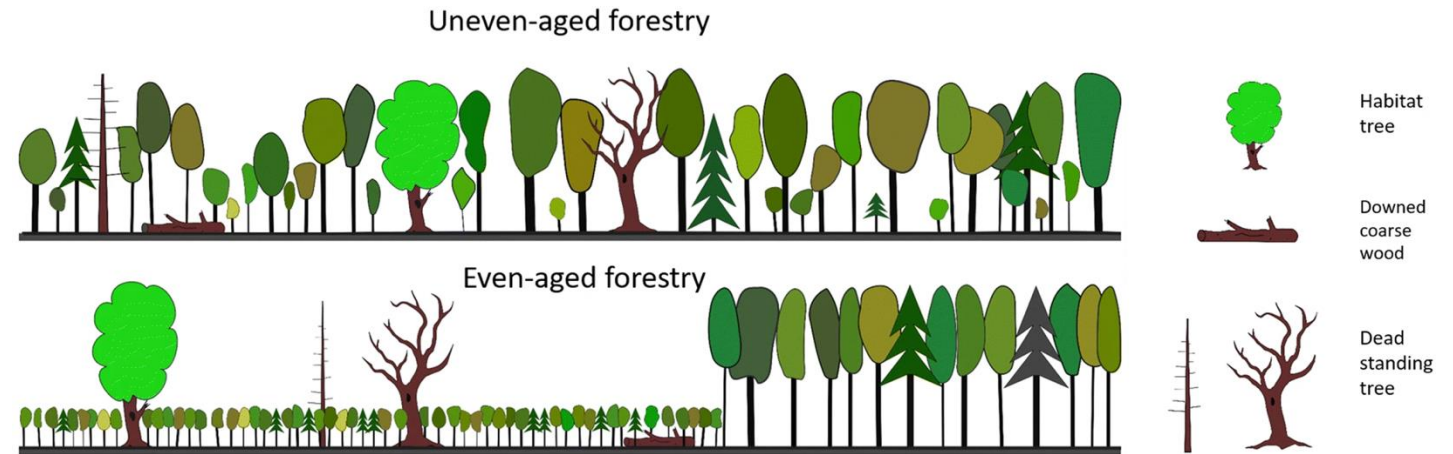


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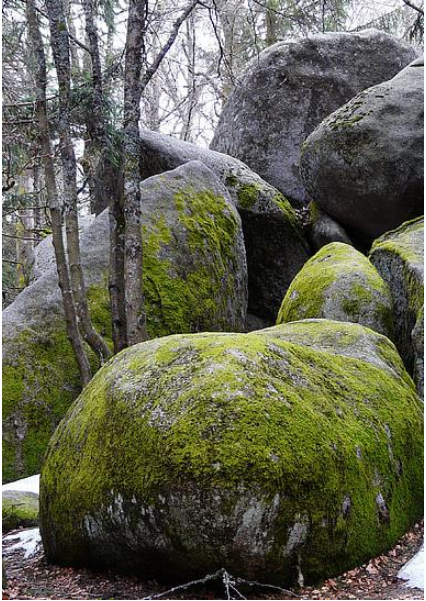


Retention forestry, Gustafsson et al., 2020

**..But how to do it in practice?**

# Integrative Forest Management promotes retention of:

**Rare biotopes**



**Downed deadwood**



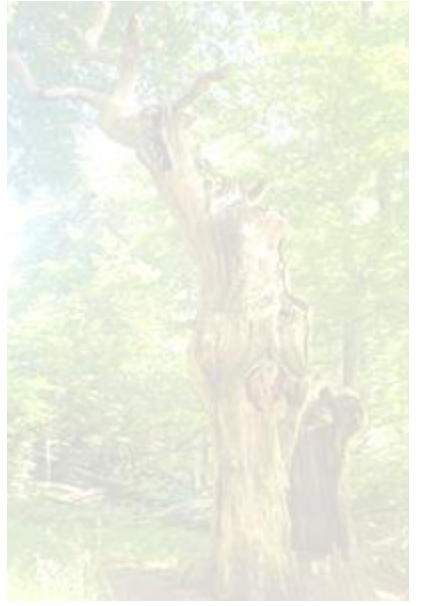
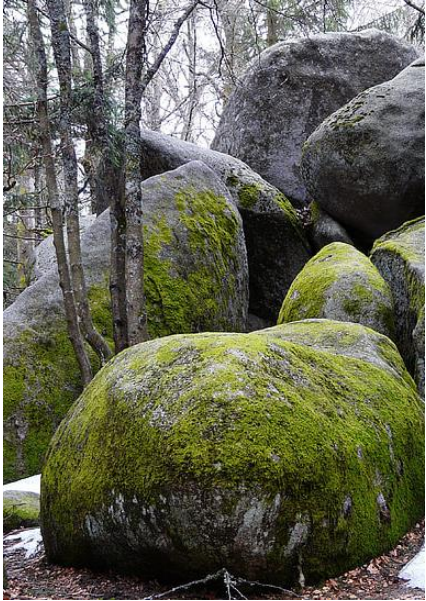
**Habitat trees:  
Living and dead**



Larsen et al., 2022; Muys et al., 2022

# Integrative Forest Management promotes retention of:

## Rare biotopes

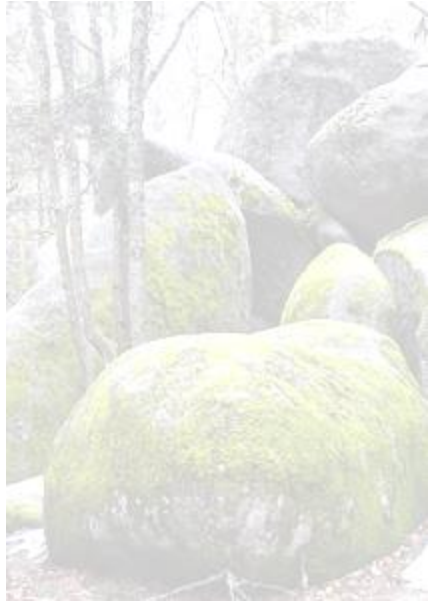


## Efforts needed for mapping and protection

Larsen et al., 2022; Muys et al., 2022

# Integrative Forest Management promotes retention of:

## Deadwood

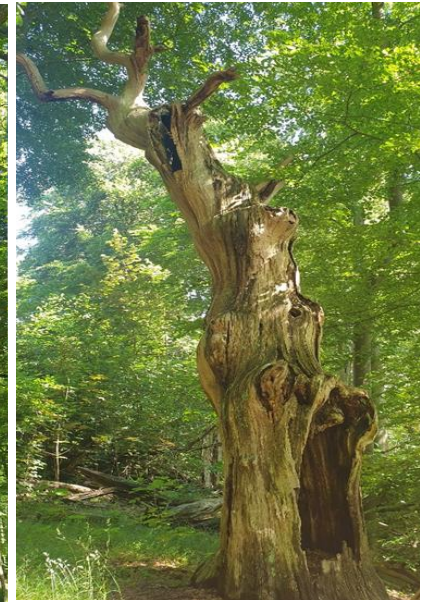
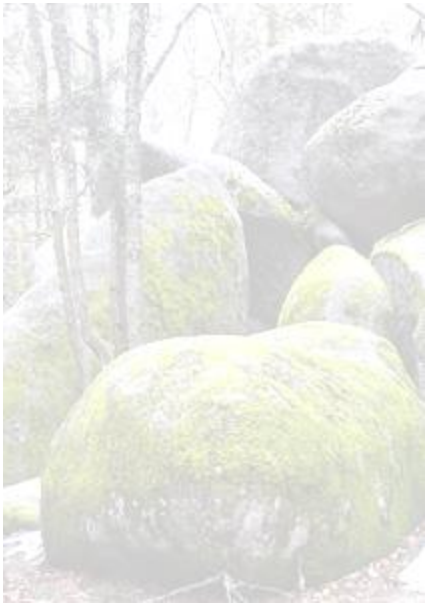


**Volumes improved  
in the last decades**

Pötzelsberger et al., 2021

# Integrative Forest Management promotes retention of:

**Habitat trees:  
Living and dead**

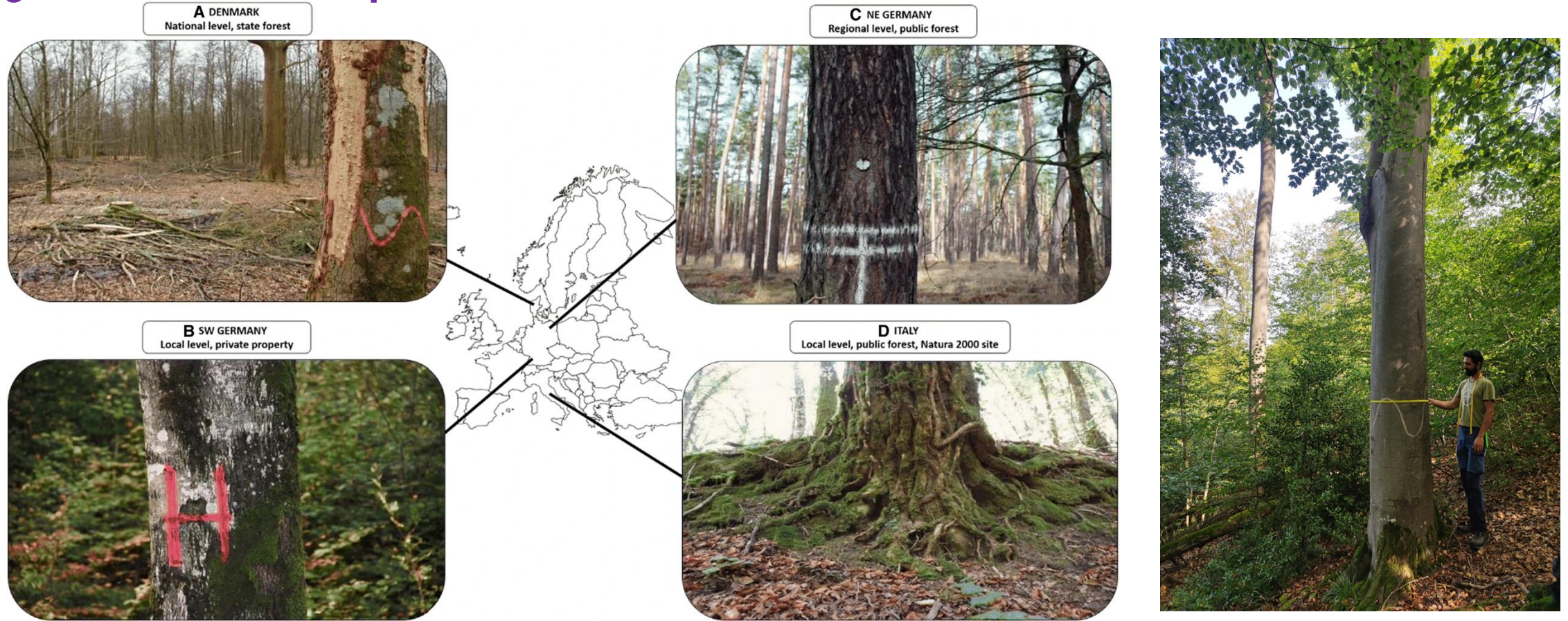


**New concept**

Gustafsson et al., 2020; Martin et al., 2022

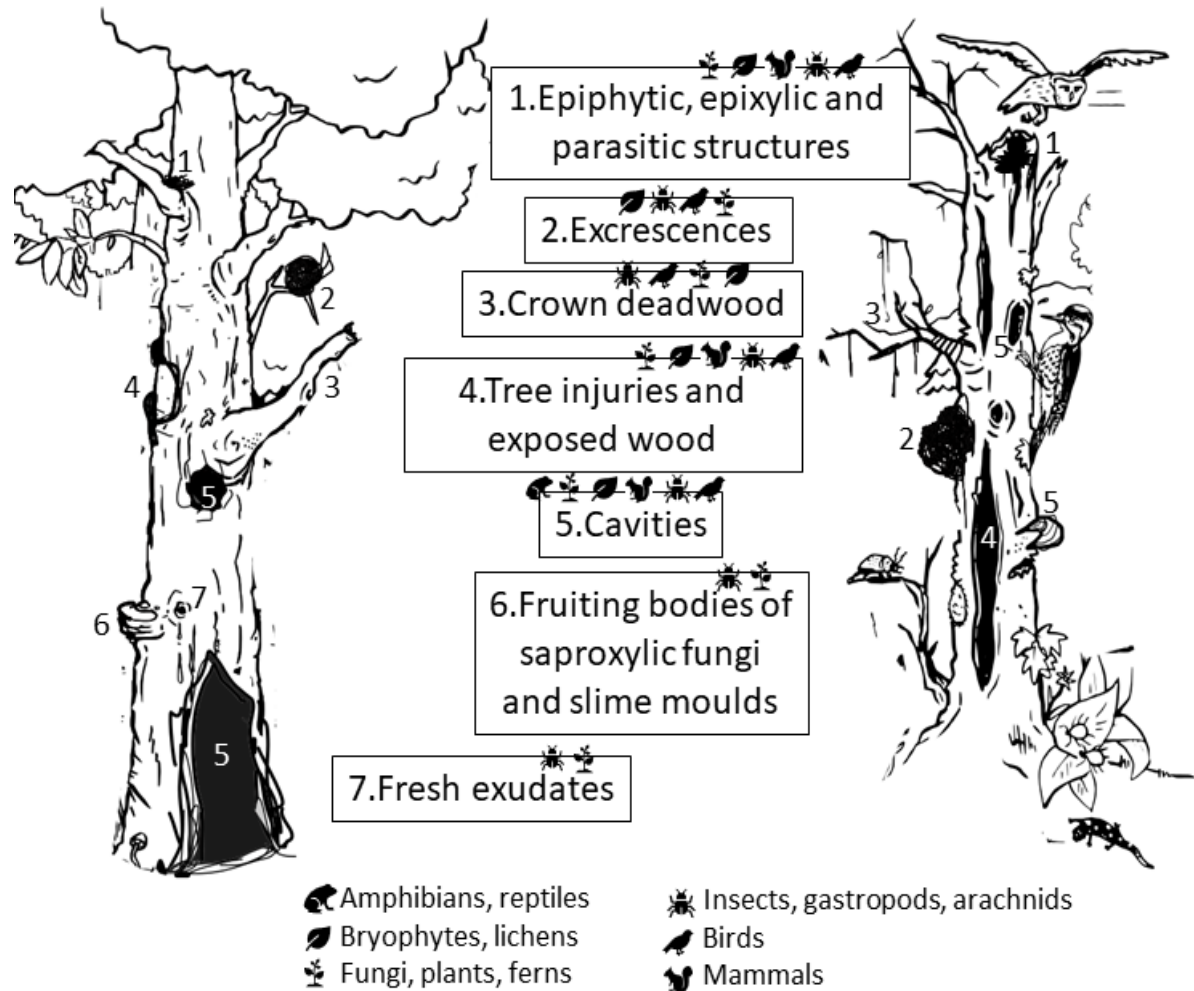
# Implications for forest management

Habitat tree retention is practiced in Europe, but the guidelines are simplistic.



Gustafsson et al., 2020, photo right: Oksanen R.

# What makes a tree a habitat?

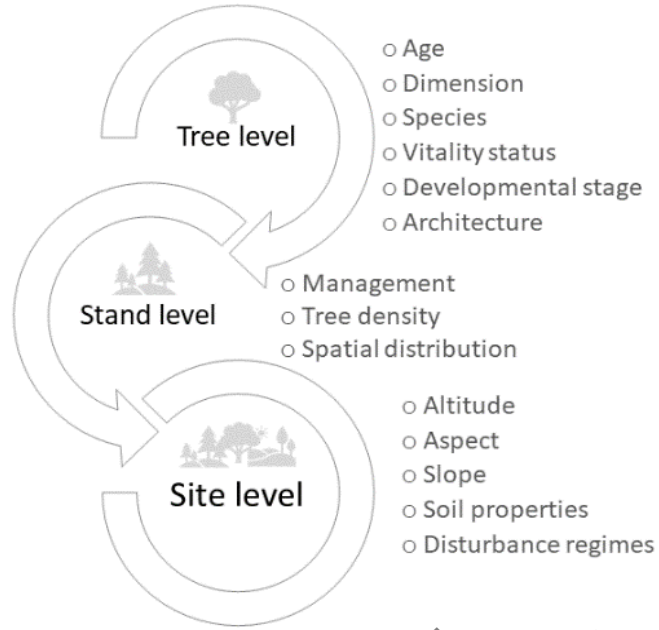


**Habitat trees** are living or dead trees that support structures crucial for the life cycle of many forest-dwelling species (tree-related microhabitats, TreMs).

Spînu 2023, inspired by Martin et al., 2022, Storch et al., 2020

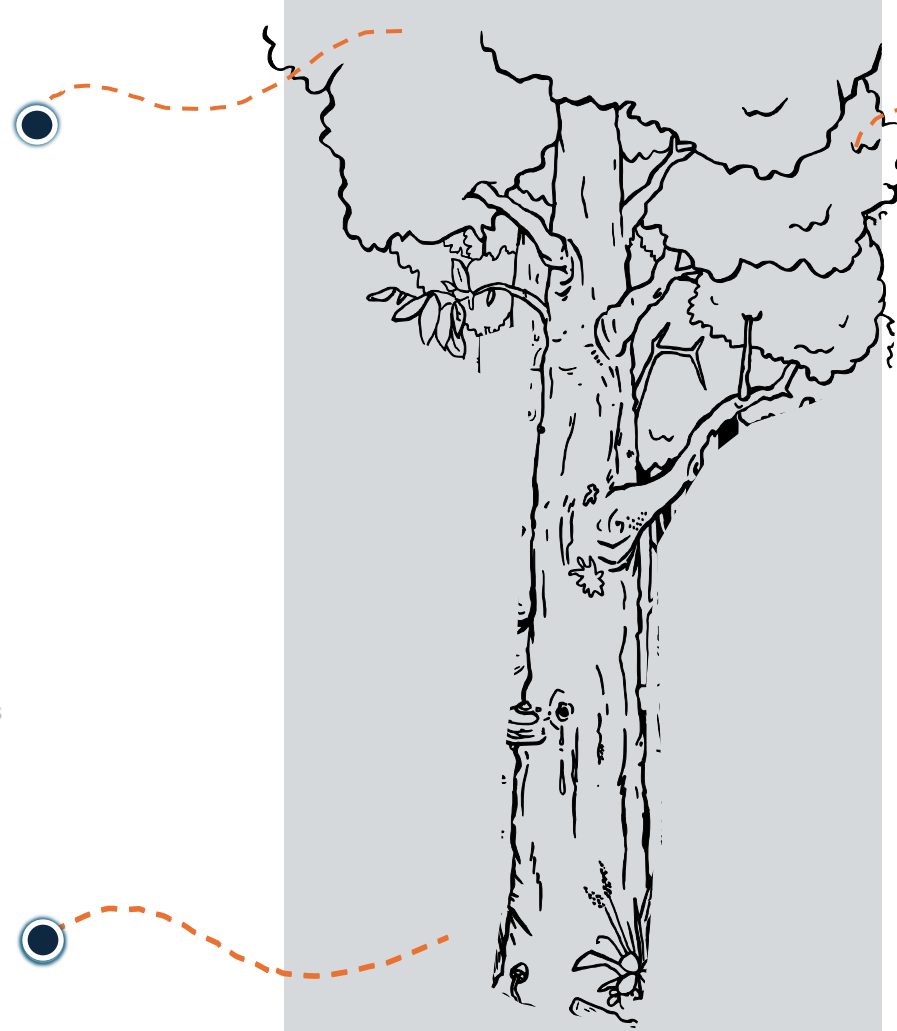
# What makes a habitat tree the best habitat trees?

Diverse, abundant or rare microhabitats



Spînu et al., 2023

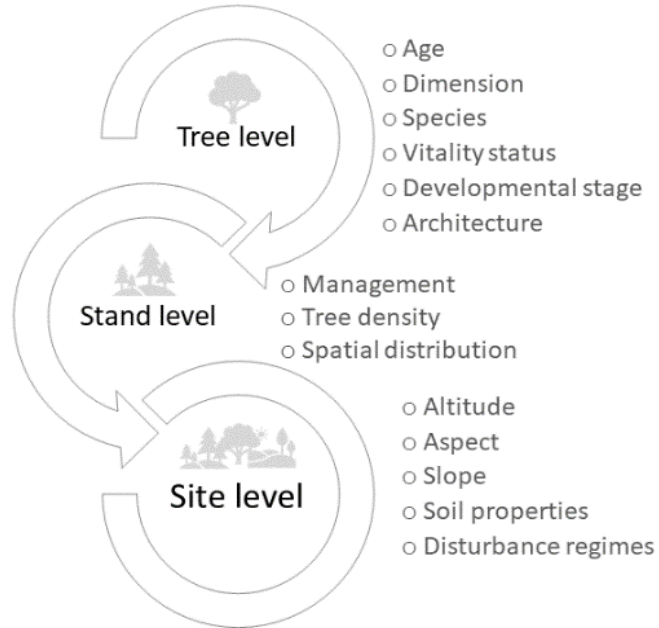
Simply being there  
Low numbers due to past management



Adapted to climate change  
Susceptibility to environmental stress

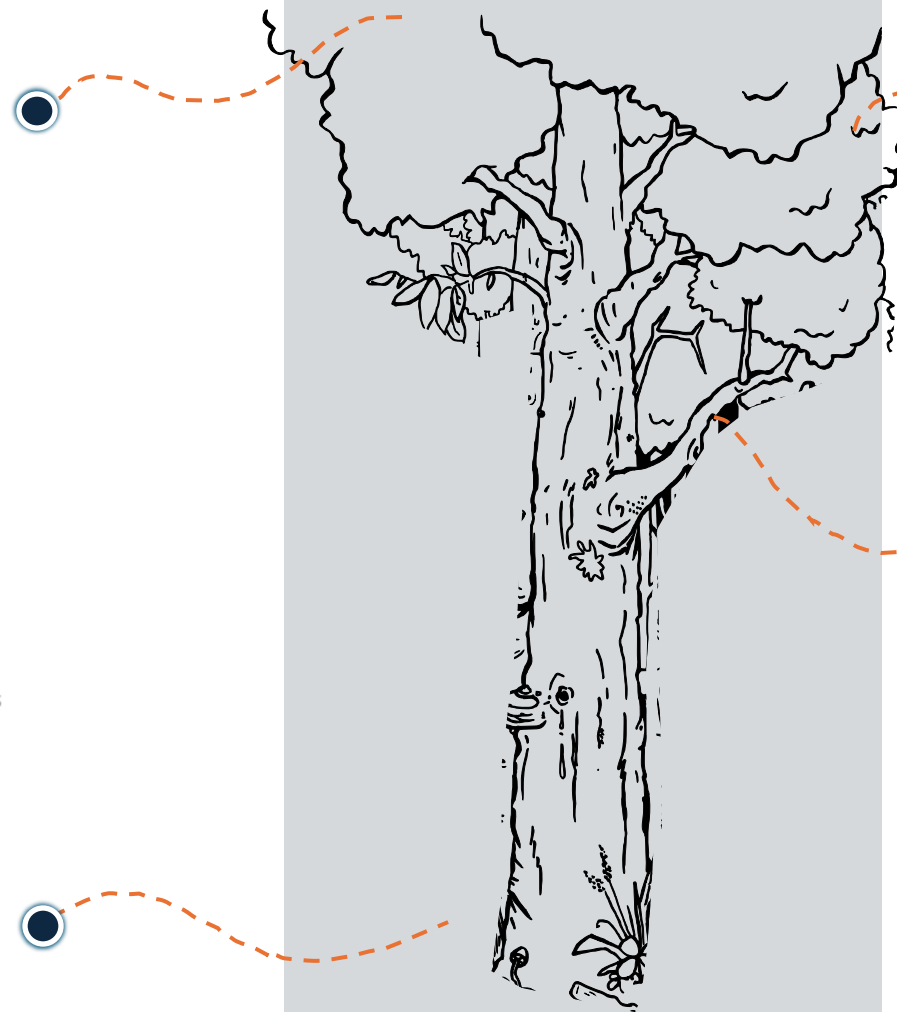
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Spînu et al., 2023

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Adapted to climate change

Susceptibility to environmental stress

Diversified choice:  
Range of functionally different trees



# Benefits for biodiversity:



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Forest Ecology and Management

journal homepage: [www.elsevier.com/locate/foreco](https://www.elsevier.com/locate/foreco)



Tree species identity modifies the efficiency of habitat tree retention for conserving epiphytes in temperate mountain forests

Dina Emrich <sup>a,1</sup>, Lena Gustafsson <sup>b,2</sup>, Stefan Kaufmann <sup>a,\*,3</sup>, Markus Hauck <sup>a,4</sup>



Forest Ecology and Management

Volume 531, 1 March 2023, 120783



## Bat habitat selection reveals positive effects of retention forestry

Anna-Lena Hendel <sup>a</sup>, Nathalie Winiger <sup>a</sup>, Marlotte Jonker <sup>a</sup>, Katarzyna Zielewska-B  
Selina Ganz <sup>c</sup>, Petra Adler <sup>c</sup>, Veronika Braunisch <sup>b, d</sup>



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Martin Denter <sup>c</sup>, Grzegorz Mikusiński <sup>d</sup>, Ilse Storch <sup>a</sup>

Current Forestry Reports (2024) 10:175–195  
<https://doi.org/10.1007/s40725-024-00216-6>

ECOLOGICAL FUNCTION (K VERHEYEN, SECTION EDITOR)

## A Systematic Review of the Effects of Multi-purpose Forest Management Practices on the Breeding Success of Forest Birds

João M. Cordeiro Pereira <sup>1</sup>, Grzegorz Mikusiński <sup>2</sup>, Ilse Storch <sup>1</sup>



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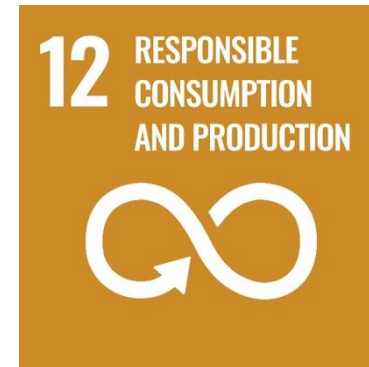
Nolan J. Rappa <sup>a,\*</sup>, Michael Staab <sup>a,b</sup>, Laura-Sophia Ruppert <sup>c</sup>, Julian Frey <sup>d</sup>, Jürgen Bauhus <sup>e</sup>,  
Alexandra-Maria Klein <sup>a</sup>



# IFM to tackle multiple crises



Foto: imago images/Steffen Schellhorn





## Key points

IFM can help navigate economic demands, adapting to climate change while maintaining ecosystem services, and safeguarding biodiversity amid human activities.

**Retention of habitat trees and deadwood** is a practice that can facilitate a balance between promotion of biodiversity and timber provisioning.

Avoidance of „one-size-fits-all“ governance approach.

# **INTEGRATE NETWORK**

**THANK YOU!**

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