



*Be wise
Be innovative
Be brave
Be Laurus*

Continuous Cover Forestry: Exploring Alternatives for Forest Management in Europe

Why CCF can be attractive for private forest owners

Iñaki Etxebeste Larrañaga

inaki.Etxebeste@ceseфор.com

ceseфор | Forestry & Climate Change Researcher | PhD in Forestry



By



Funded by
the European Union



Why Continuous Cover Forestry?

Why continuous cover forestry?





Why CCF ?

1. The Core Challenge: Managing uncertainty
2. What is Continuous Cover Forestry?:
Core principles
3. The Financial Paradigm Shift:
4. Ecological & Economic Value Alignment:
Optimization
5. Managing Risk & Uncertainty
6. Real-World Examples
7. Practical Considerations for
YOUR Forest
8. Summary – Learn more
9. Q&A



Why CCF?

MUM Look at these pictures...

Grandpa planted just Monterrey pines... look at them now,
what are we going to do?
he didn't leave a single a hardwood...

ME He was following the manual of the time, Mum.

MUM I know, but look at it know. I just keep wondering...
did Grandpa use the wrong silviculture entirely?
Was he just being stubborn or greedy, or did he actually think
this was the way to manage a forest long-term?

ME It wasn't about being stubborn. Back then, "success" was
measured in straight lines and quick yields.
The ecology of it wasn't even on the radar for most farmers and
owners.



Why CCF?

MUM It just feels like a mess we have to clean up.

ME Maybe.

But he wasn't trying to sabotage the land.

He **did the best with the knowledge he had** at the time. To him, he wasn't creating a "monoculture mess"—**he was building a future for us the only way he knew** how.

We're just lucky enough to have better books now.

MUM I suppose.

He did love those trees.

Now is YOUR turn.



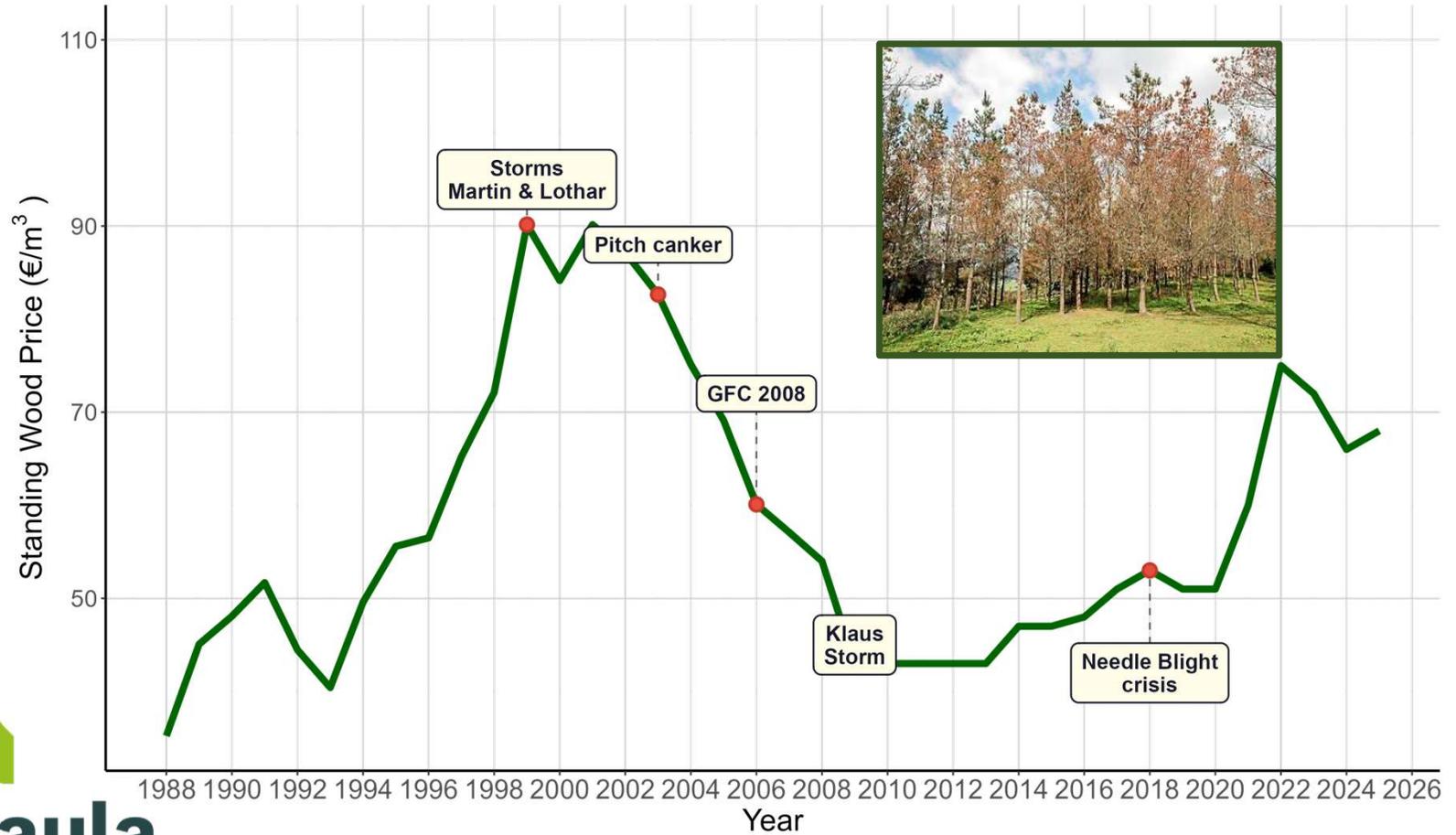


The Core Challenge: Managing Uncertainty

Resilience and adaptation to global changes



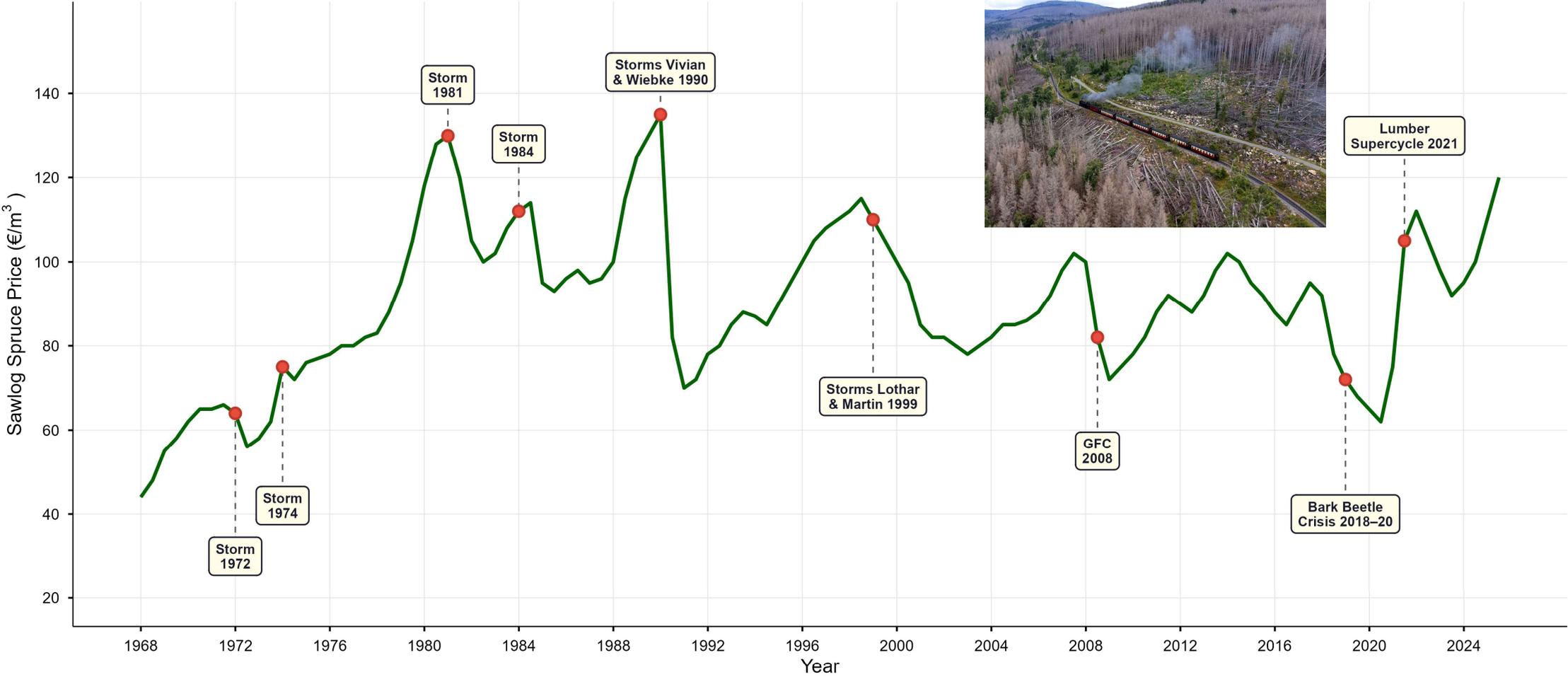
Prices as proxies



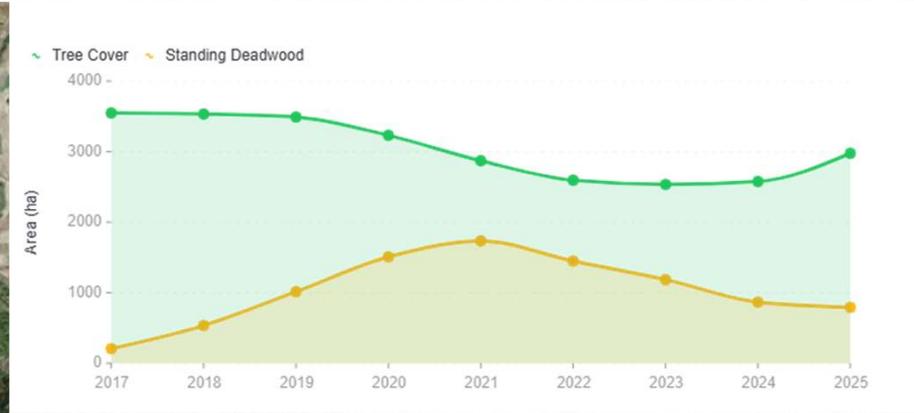
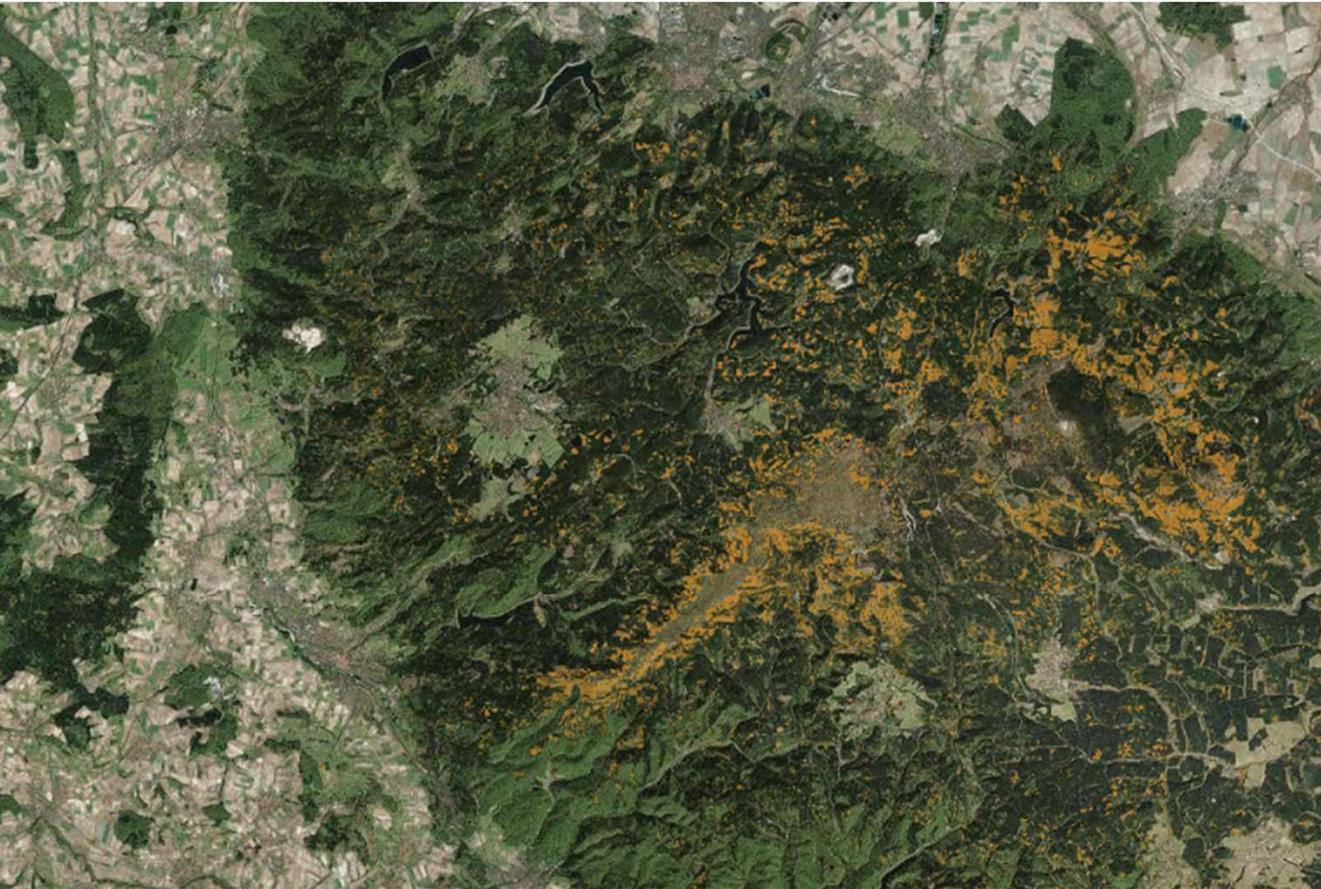
Prices as proxies

Sawlog Spruce Prices in Germany (1968–2025)

Price drops following storms, financial crises, and bark beetle outbreaks



1968–2002: Digitised from Hanewinkel (FVA Baden-Württemberg).
2003–2025: Reconstructed from ESPI, Destatis, Holzkurier, and market reports.
Values are approximate nominal €/m³ (B/C, 2b+, free forest road).



Fractional Cover
Sentinel-2 based

Standing Deadwood 0-100%

Clicked Location
Click on map to see values

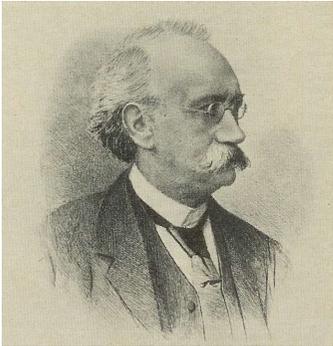


deadtrees.earth



What is Continuous Cover Forestry?

Silvicultural systems



Karl Gayer, "The Mixed Forest", 1886

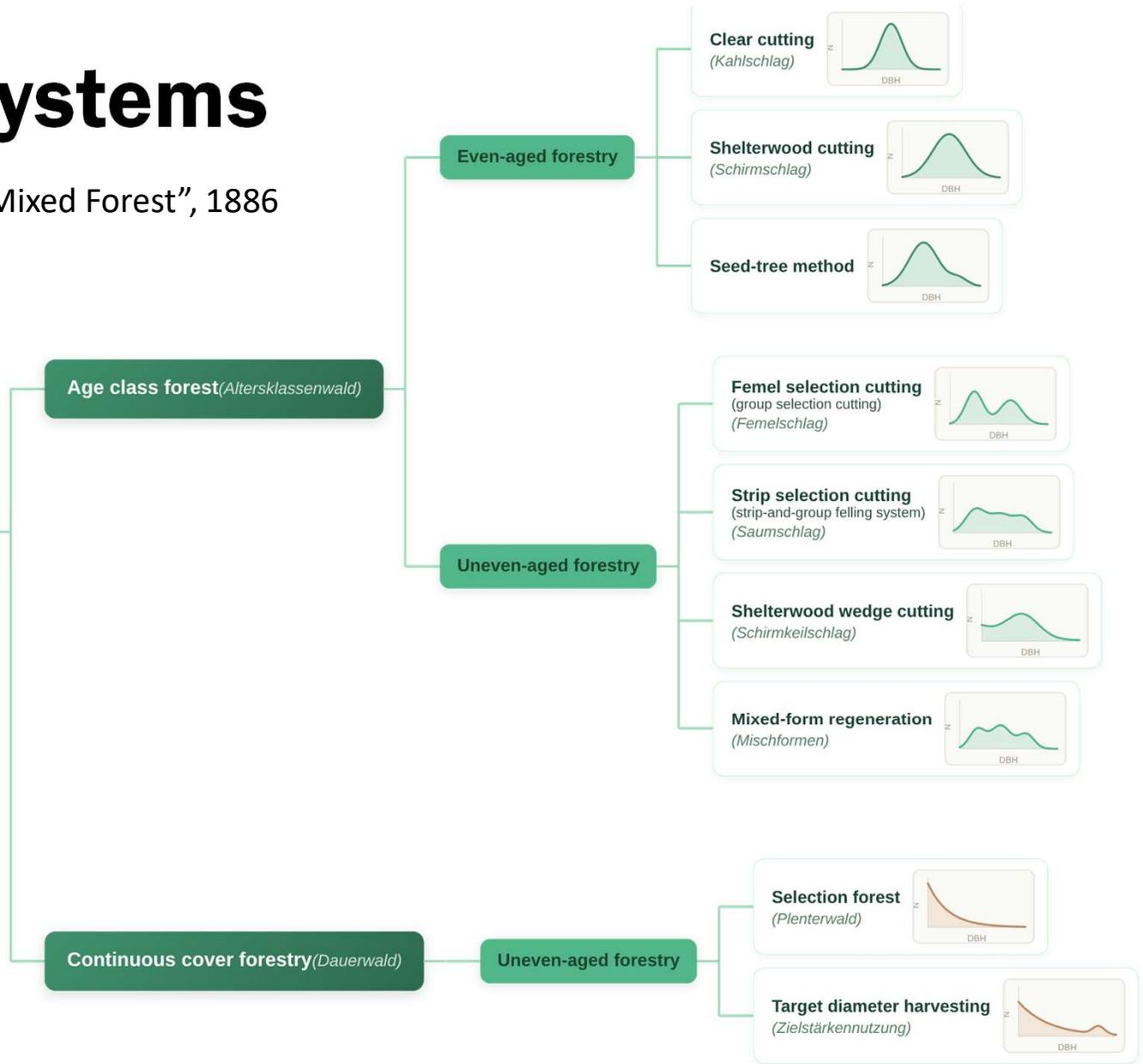


High Forest (*Hochwald*)

Alfred Möller, "Dauerwald", 1913



selviaula
Formamos un futuro sostenible

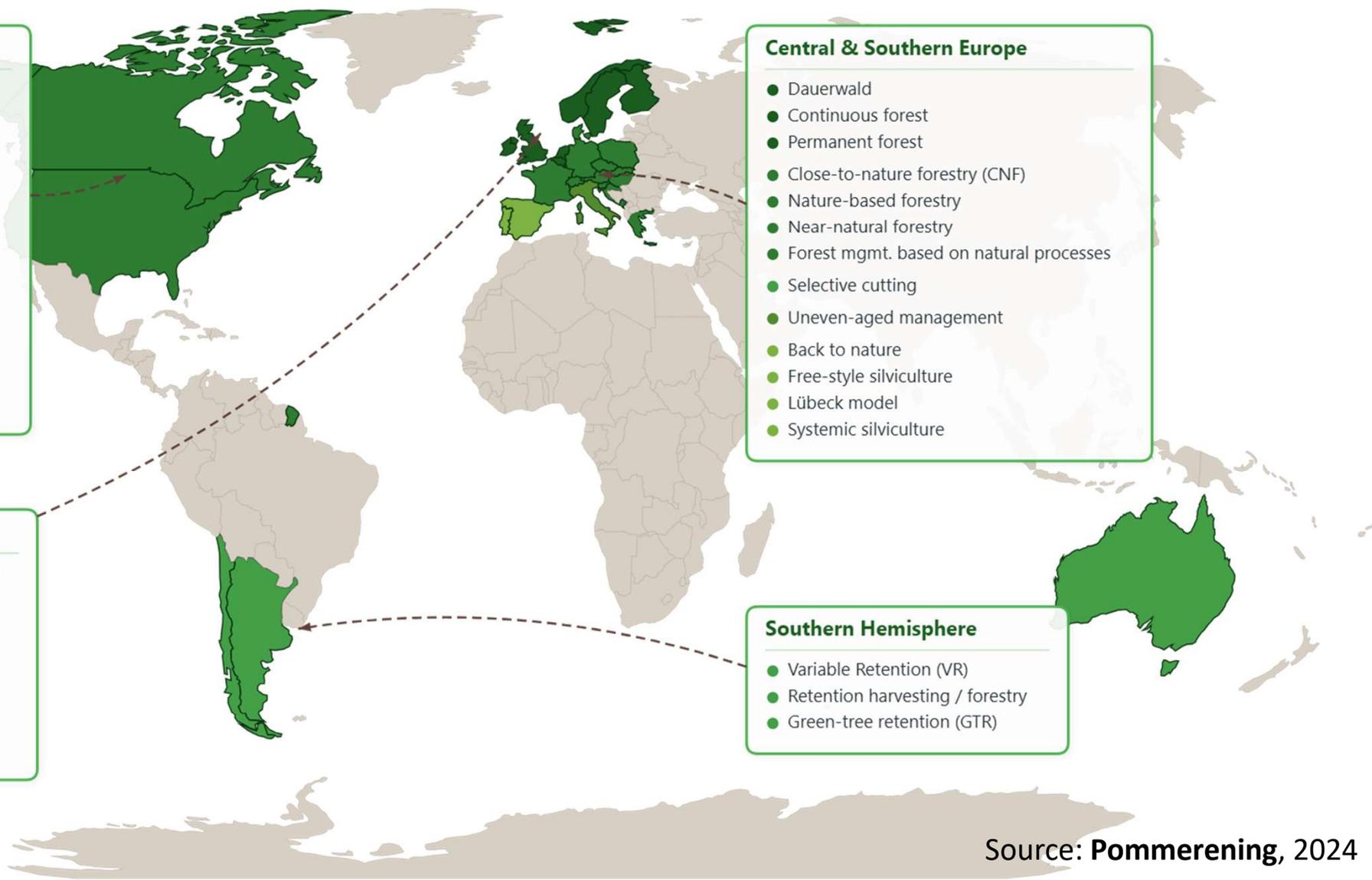


- ### North America
- Alternatives to clearfelling
 - Ecological forestry
 - Ecoforestry
 - Ecosystem management
 - Naturalistic silvicultural systems
 - Restoration forestry
 - Variable Retention (VR)
 - Green-tree retention (GTR)
 - Retention harvesting / forestry
 - Selective cutting
 - Uneven-aged management
 - New forestry

- ### Central & Southern Europe
- Dauerwald
 - Continuous forest
 - Permanent forest
 - Close-to-nature forestry (CNF)
 - Nature-based forestry
 - Near-natural forestry
 - Forest mgmt. based on natural processes
 - Selective cutting
 - Uneven-aged management
 - Back to nature
 - Free-style silviculture
 - Lübeck model
 - Systemic silviculture

- ### Northern Europe
- Continuous Cover Forestry (CCF)
 - Continuous cover silviculture
 - Low-impact silviculture
 - Nature-orientated silviculture
 - Irregular structure forestry
 - Diversity-orientated silviculture
 - Holistic forestry

- ### Southern Hemisphere
- Variable Retention (VR)
 - Retention harvesting / forestry
 - Green-tree retention (GTR)



Source: Pommerening, 2024



Most common principles of CCF

Ecological Foundation

- Maintain woodland climate and soil integrity – **avoid significant disturbance**
- Rely on **natural processes** (regeneration, self-pruning, self-thinning)
- Prioritize **native species** and locally adapted provenances



Source: Pommerening, 2024

Most common principles of CCF

Structural diversity

- Promote varied **vertical and horizontal stand structure** to support biodiversity and resilience
- Encourage **species, size, and genetic diversity**



Source: Pommerening, 2024

Most common principles of CCF

Management approach

- Use **selective** individual-tree silviculture
– no rotation periods
- All operations should **minimize** soil and ecosystem **disturbance**
- Match tree species/provenances to **local site conditions**



Source: Pommerening, 2024



Most common principles of CCF

Conservation & Biodiversity

- **Retain** old trees, deadwood, and features supporting rare species
- **Manage deer/grazing pressure** to allow natural regeneration without losing biodiversity
- **Establish** forest margins, special habitats and nature reserves

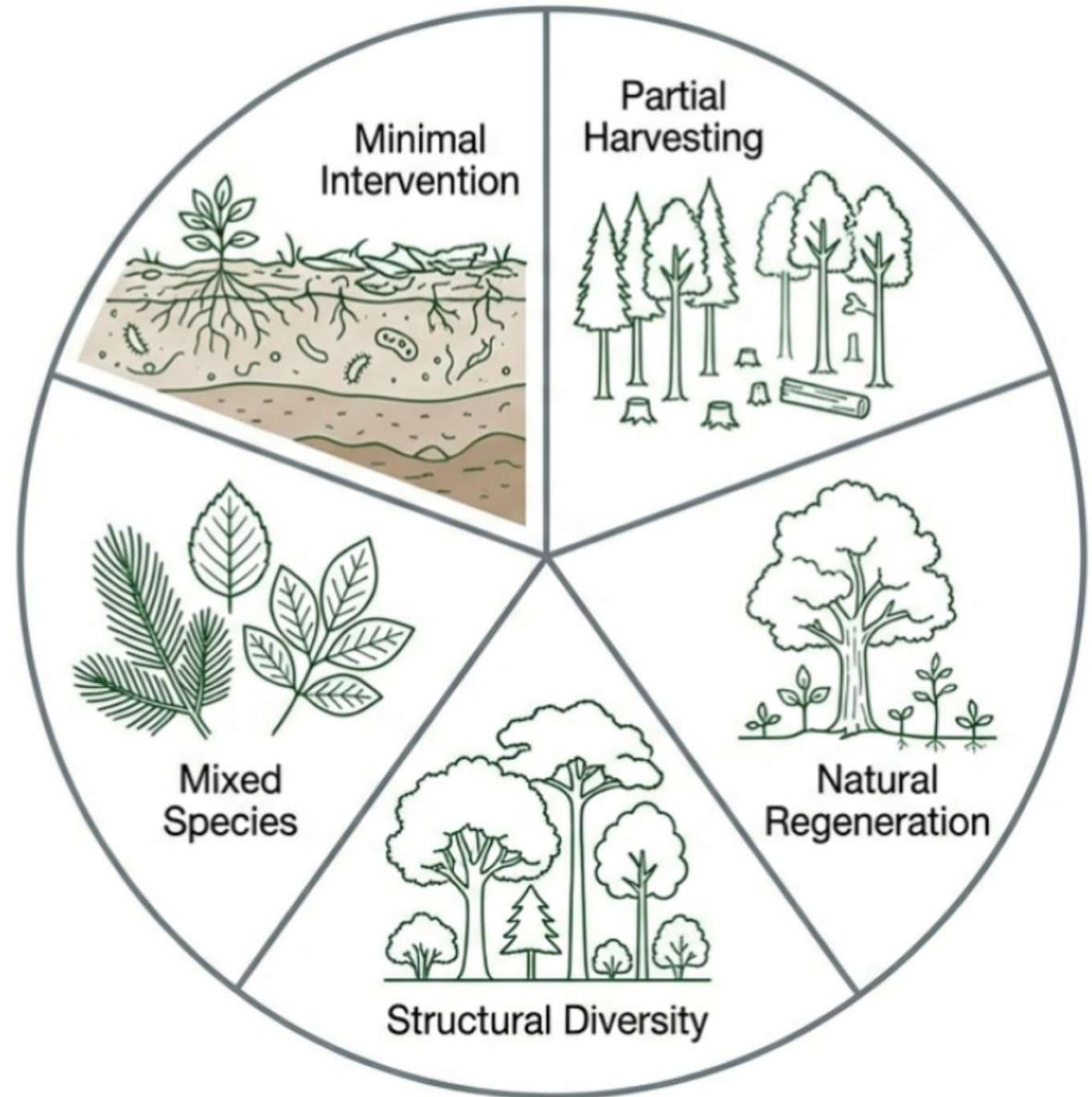


Source: Pommerening, 2024



In other words

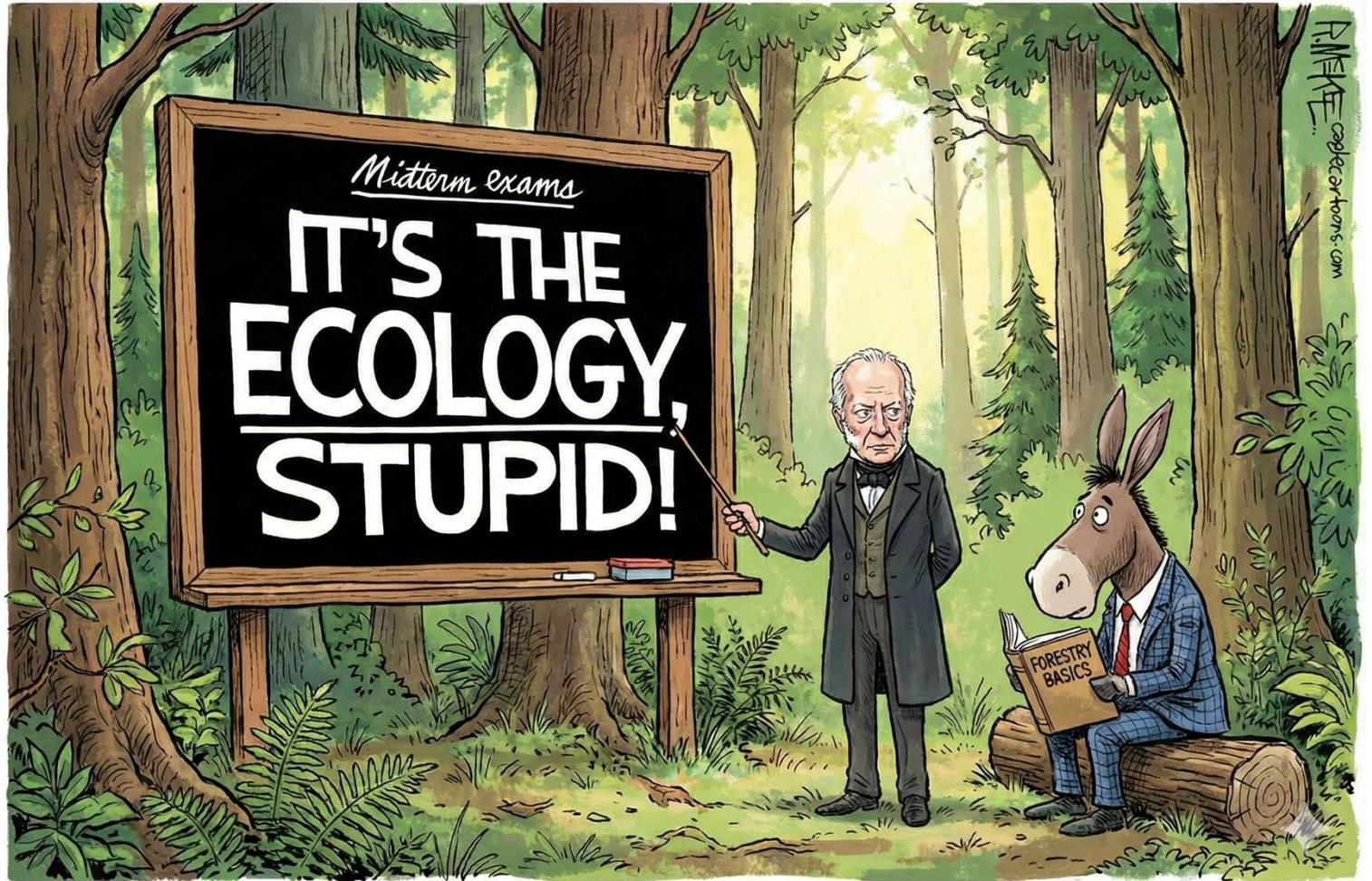
- **Nature-Based Solutions**
- **Ecosystem services**
- **Ecosystem restoration**





Ecological & Economic Value Alignment: Optimization of provisioning ES

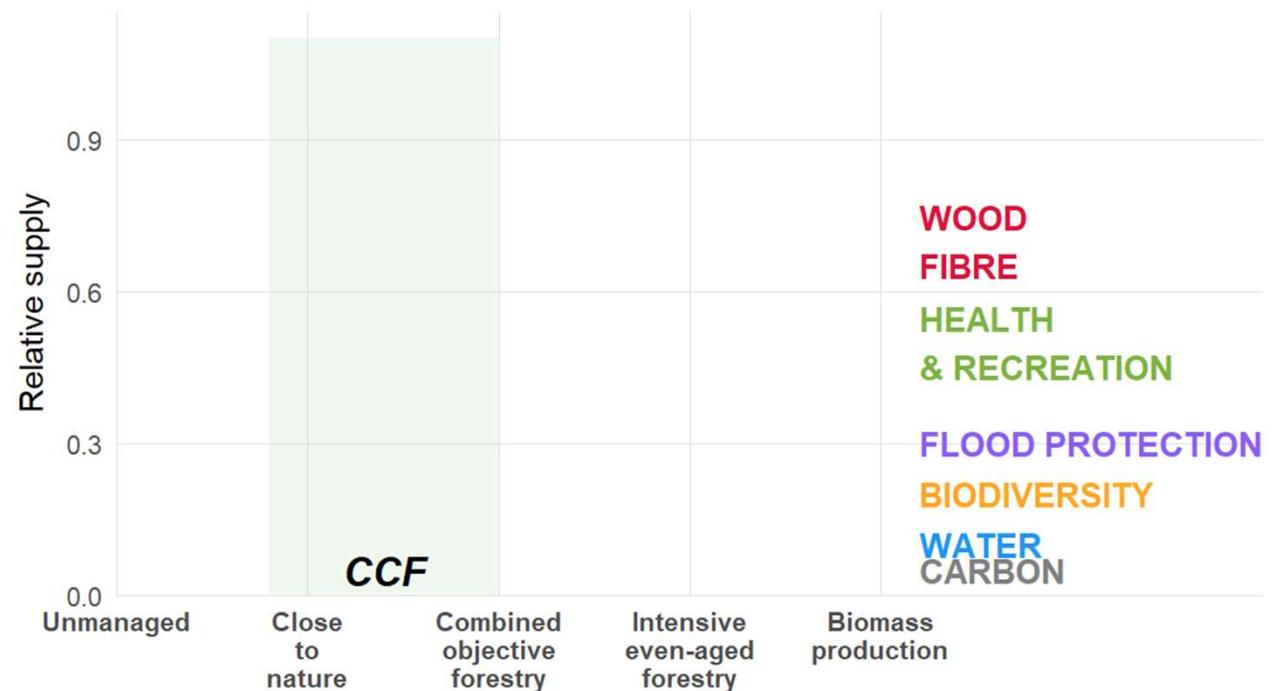




Formamos un futuro sostenible

Maximization Vs. Optimization

Which are the demands for our forests today? tomorrow?





The Financial Paradigm Shift

Seven commercial reasons to consider CCF management

1. Early revenues.
2. More stable economic returns over time.
3. Avoid most planting costs.
4. Produce larger and more valuable trees.
5. Affordable management and harvesting costs.
6. Grows and maintains the capital value.
7. Net reduction of abiotic and biotic risks.



Investing in Continuous Cover Forestry

White Paper

Paul McMahon, SLM Partners
Darius Sarshar, SLM Partners
Paddy Purser, Purser Tarleton Russell Ltd

September 2016



© SLM Partners

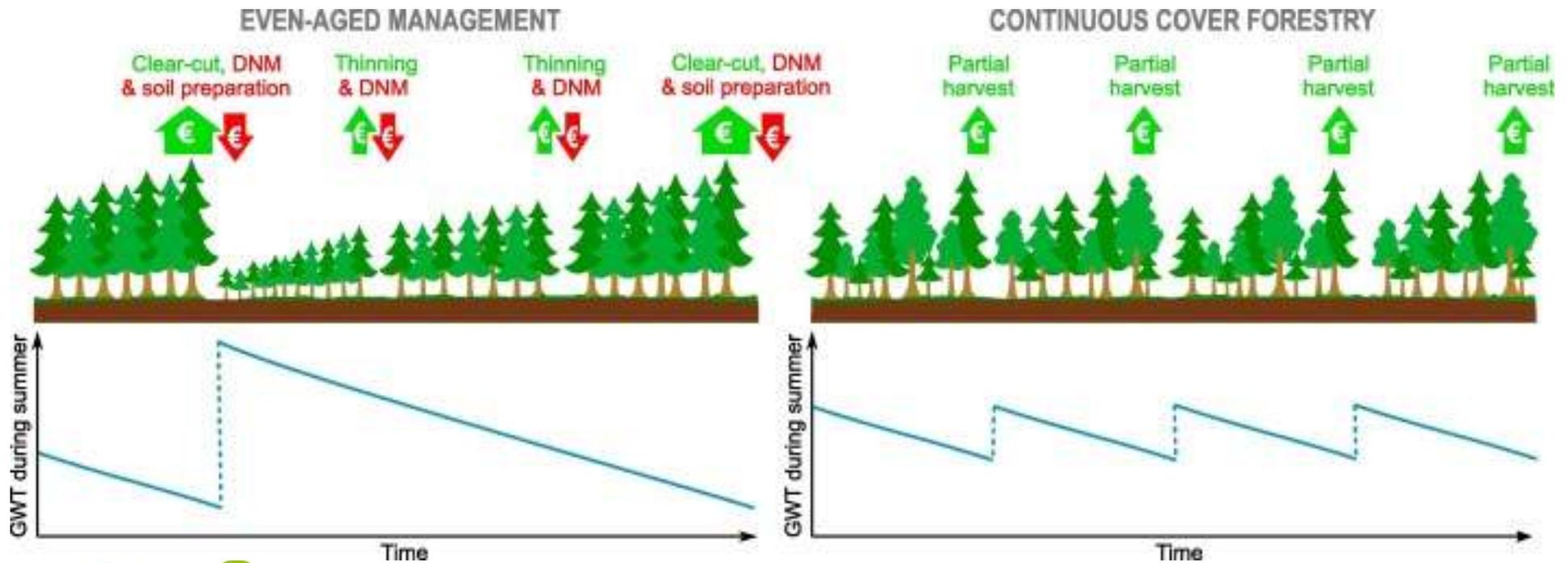
Evidences for early revenues

- **Heavy, repeated thinning during the early stages of transformation**
- **Irish Sitka spruce models indicates that net income during the first four thinnings can be 60% higher**



High quality spruce logs from target diameter thinning, Knockrath, Co. Wicklow, Ireland

More stable economic returns over time



Avoid most planting costs

- **Avoidance of artificial planting costs and the associated establishment risks provides a structural boost to the asset's overall internal rate of return.**



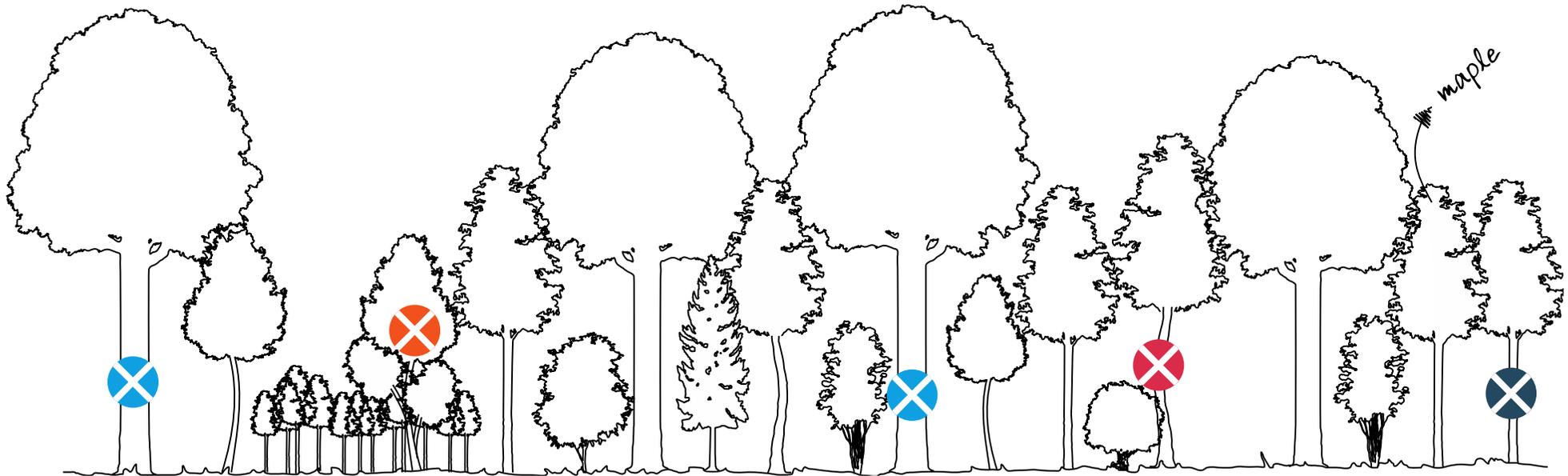
Produce larger and more valuable trees

 Harvesting

 Improvement

 Regeneration

 Diversity



*** VALUE: TIMBER - ECONOMIC**
ECOSYSTEM - ECOLOGICAL

Affordable management and harvesting costs

Harvesting costs under different management systems

Treatment	Basal area before thinning (m ² ha ⁻¹)	Per cent basal area removed	Harvesting time (min m ⁻³)	Sawlog per cent	Cost (£m ⁻³)
Clear felling ⁱ	46.1	100	6.5	81.0	9.7
Low thinning ⁱ	44.9	20.5	10.5	73.0	13.0
Group felling	43.9	19.4	7.7	74.0	12.8
Frame tree thinning ⁱⁱ	42.8	19.6	8.0	81.5	11.4
Target diameter thinning ⁱⁱ	39.3	21.8	7.7	87.0	10.0

Comparative harvesting outputs, sawlog outturn, and costs of standard operations and different transformation thinnings in a 37-year old Sitka spruce stand in Wales.

ⁱ Conventional clearfell management; ⁱⁱ CCF management

Source: Mason, W.L. (2015) Implementing Continuous Cover Forestry in Planted Forests



Grows and maintains the capital value

- **Maintaining permanent standing stock and avoiding the periodic "liquidation-and-reset" cycle of clearfelling.**
- **This perpetual asset base provides long-term security and steady appreciation, making it an ideal core holding for institutional portfolios.**



And risks?

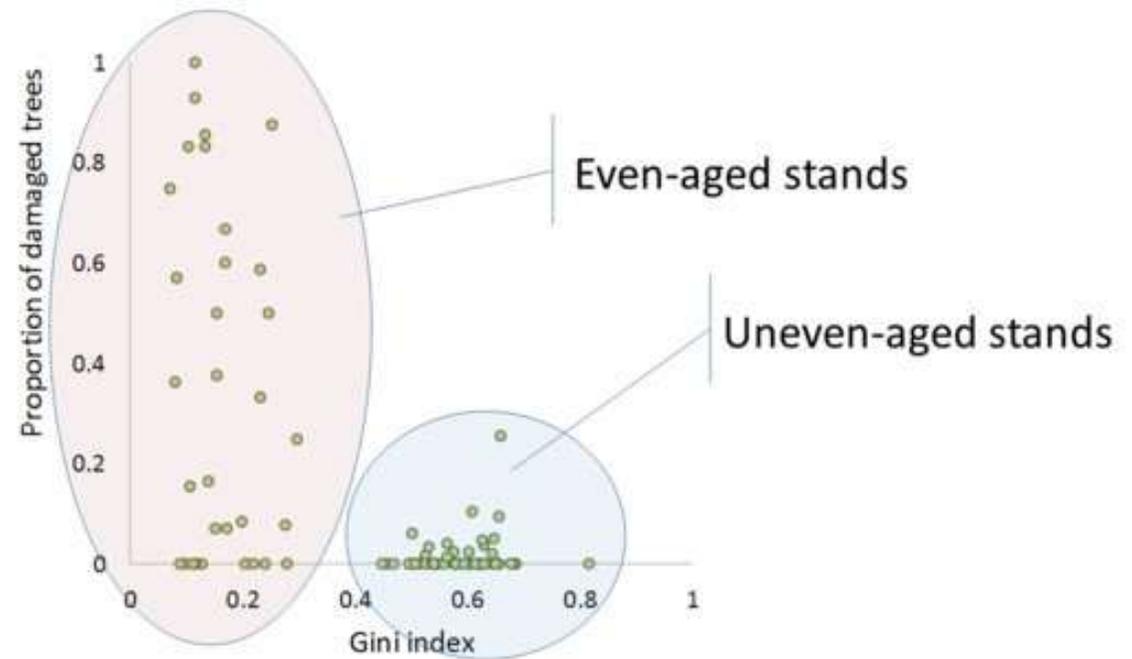




Managing Risks & Uncertainty

Managing risks

Wind and CCF



Forest Ecology and Management

Volume 372, 15 July 2016, Pages 120-127



Continuous cover management reduces wind damage

Timo Pukkala ^a, Olavi Laiho ^b, Erkki Lähde ^b

Managing risks

Pests and CCF

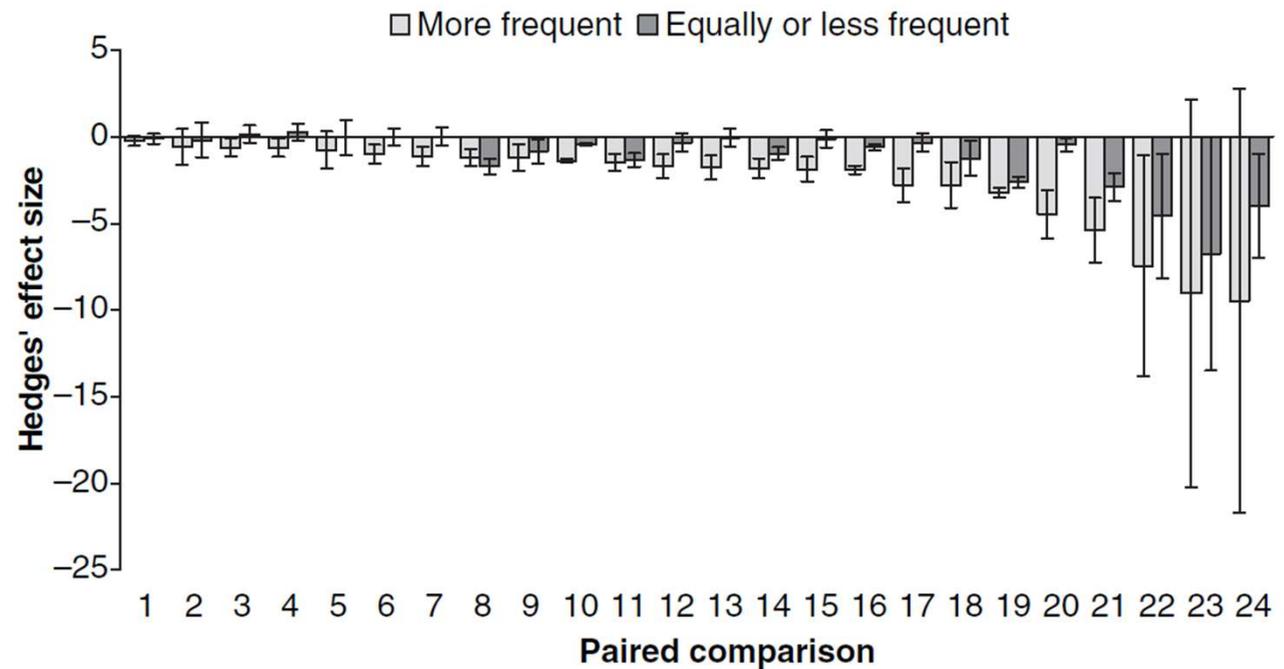
ECOLOGY LETTERS

Tree diversity reduces herbivory by forest insects

Hervé Jactel  Eckehard G. Brockerhoff

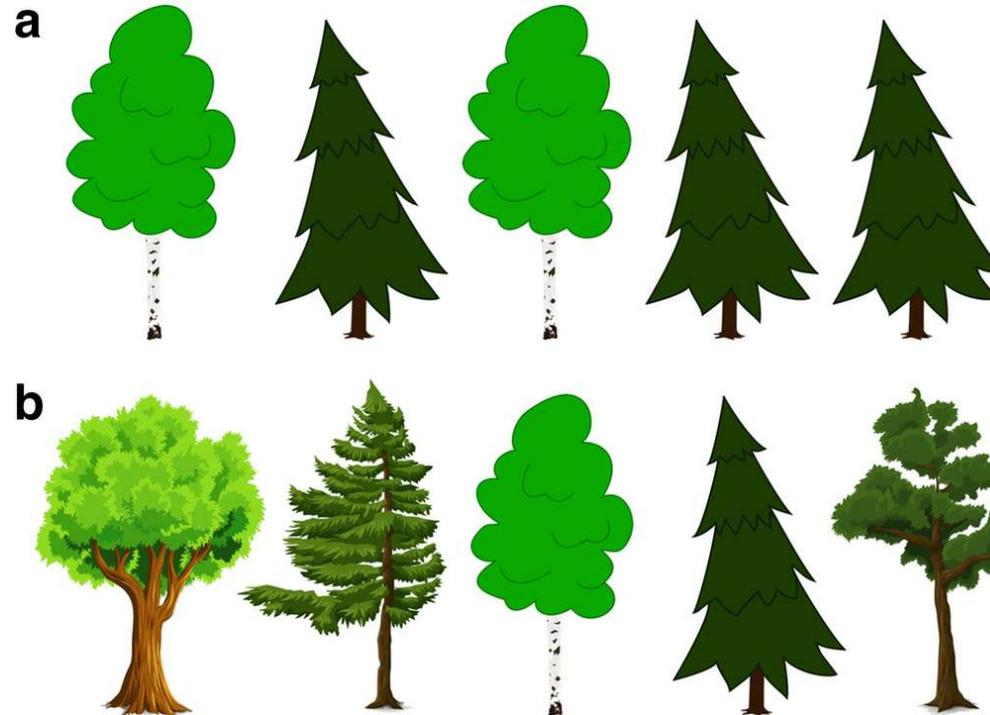
First published: 27 July 2007 | <https://doi.org/10.1111/j.1461-0248.2007.01073.x> | [VIEW METRICS](#)

Ensis is a joint venture between CSIRO and Scion/New Zealand Forest Research Institute.



Managing risks

Pests and CCF



Richness: 2 species
Functional diversity: High
Functional redundancy: Low

Richness: 5 species
Functional diversity: High
Functional redundancy: High

Messier et al. (2019)

Other benefits of diversity

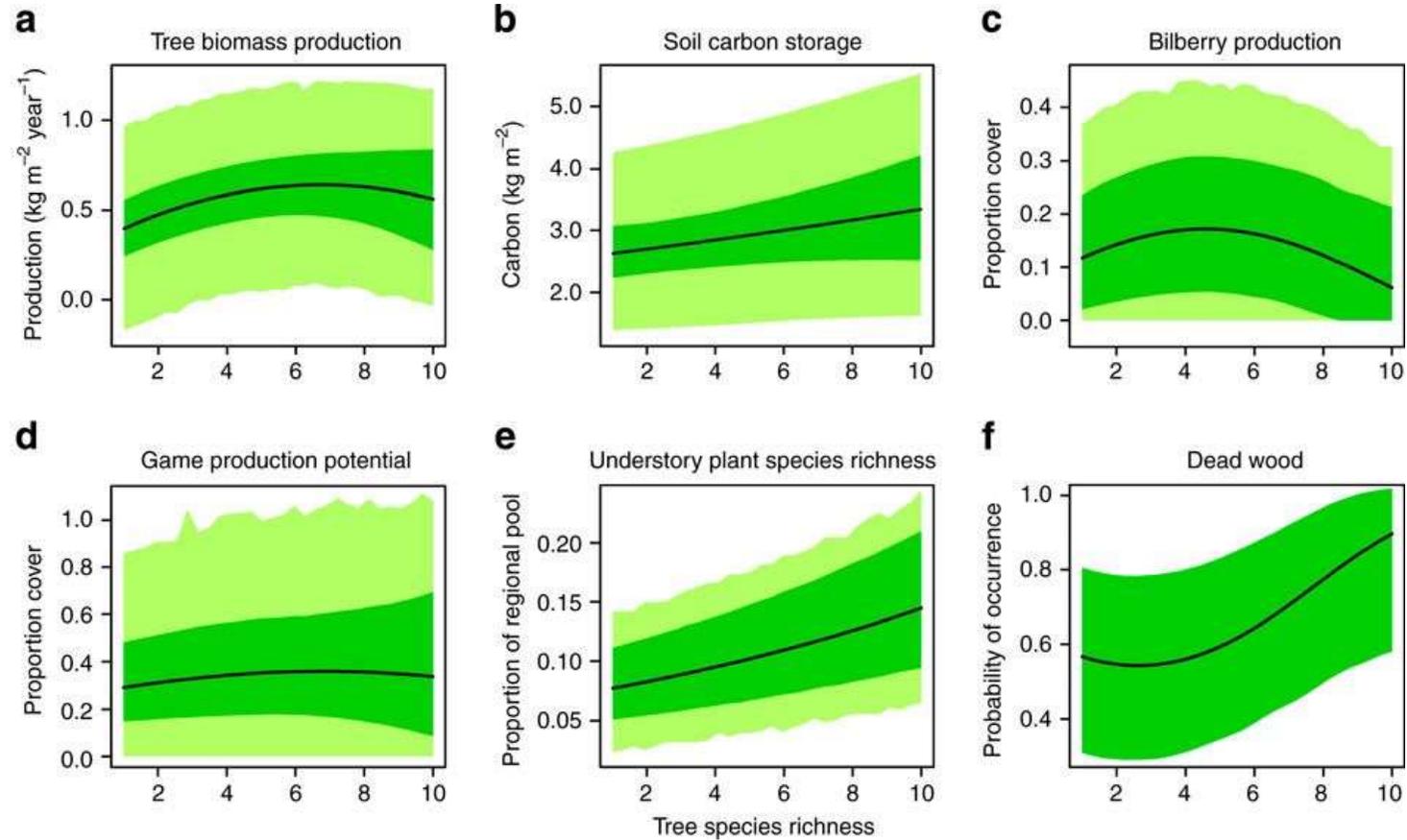
Open Access | Published: 08 January 2013

Higher levels of multiple ecosystem services are found in forests with more tree species

Lars Gamfeldt, Tord Snäll, Robert Bagchi, Micael Jonsson, Lena Gustafsson, Petter Kjellander, María C. Ruiz-Jaen, Mats Fröberg, Johan Stendahl, Christopher D. Philipson, Grzegorz Mikusiński, Erik Andersson, Bertil Westerlund, Henrik Andrén, Fredrik Moberg, Jon Moen & Jan Bengtsson

Nature Communications 4, Article number: 1340 (2013) | Cite this article

9813 Accesses | 599 Citations | 116 Altmetric | Metrics

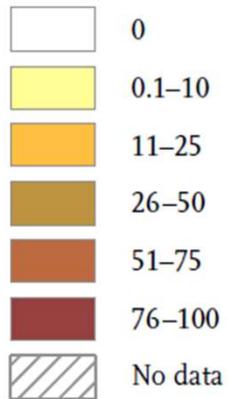




Real-World Examples The CCF Network

The misconception: "CCF is only for public or huge estates."

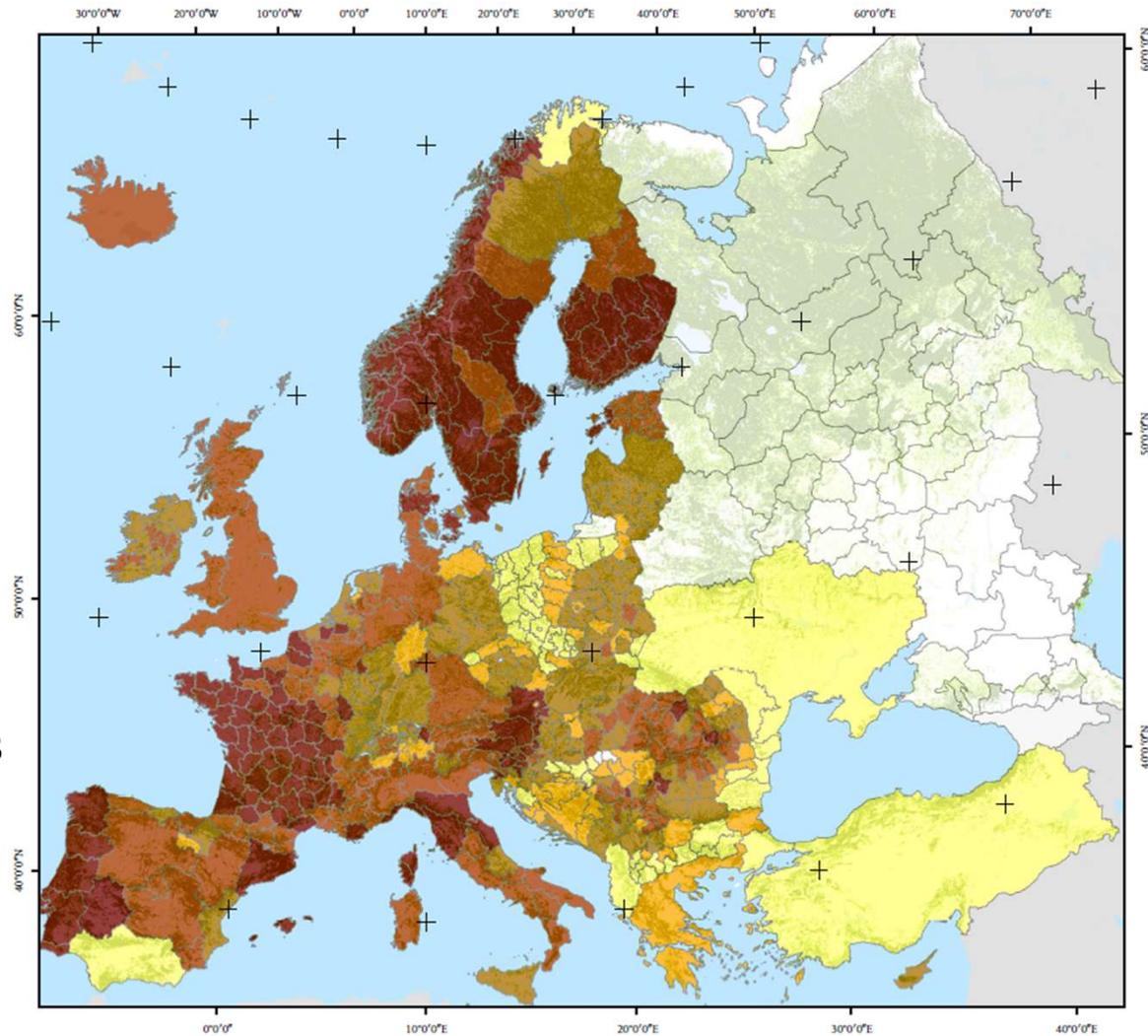
Proportion of forest land in private ownership (%)



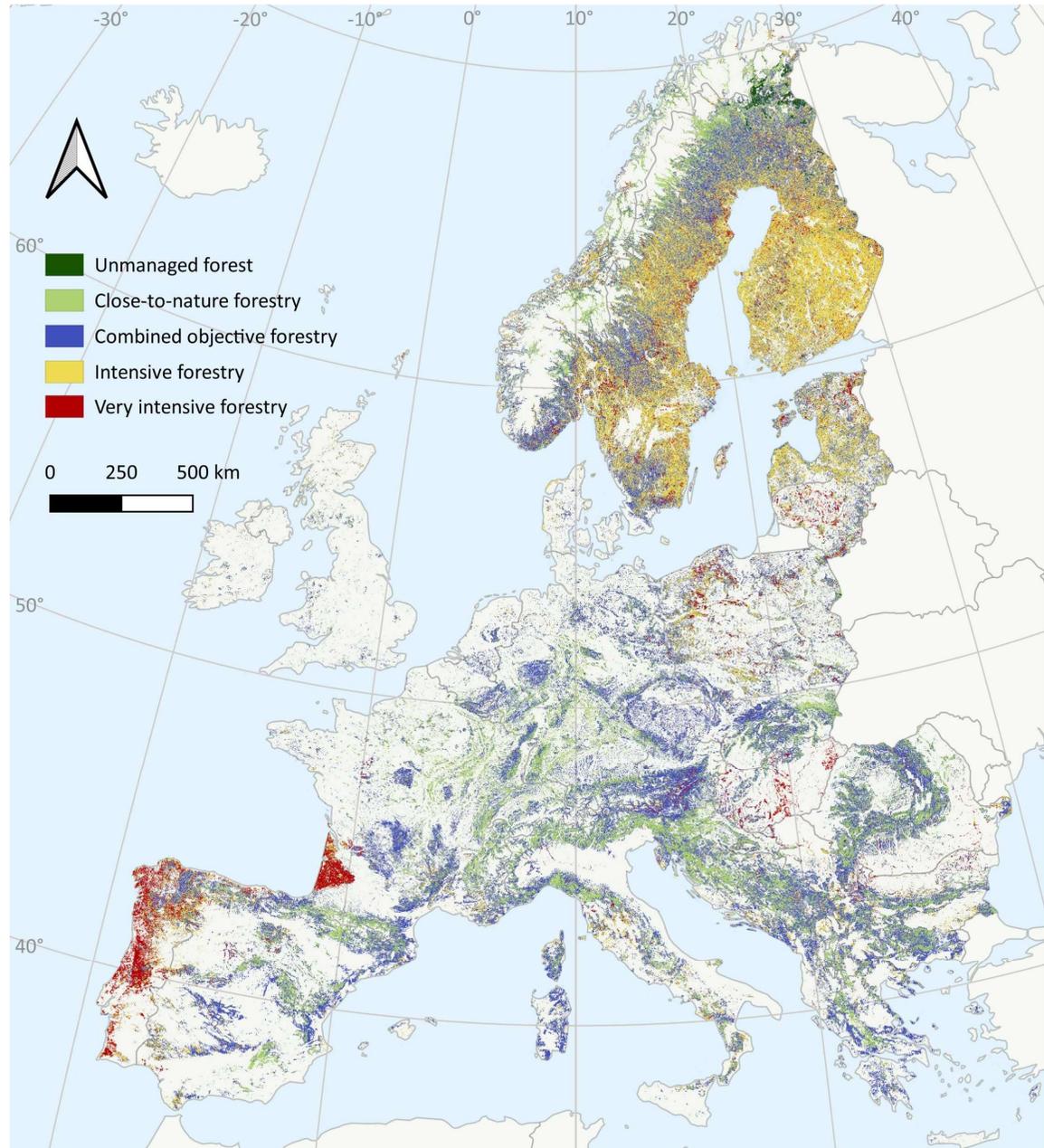

 EUROPEAN FOREST INSTITUTE
 CENTRAL EUROPEAN REGIONAL OFFICE AND THE
 OBSERVATORY FOR EUROPEAN FORESTS – EFICENT-OEF



Source: Pulla et al., 2013



Widespread model

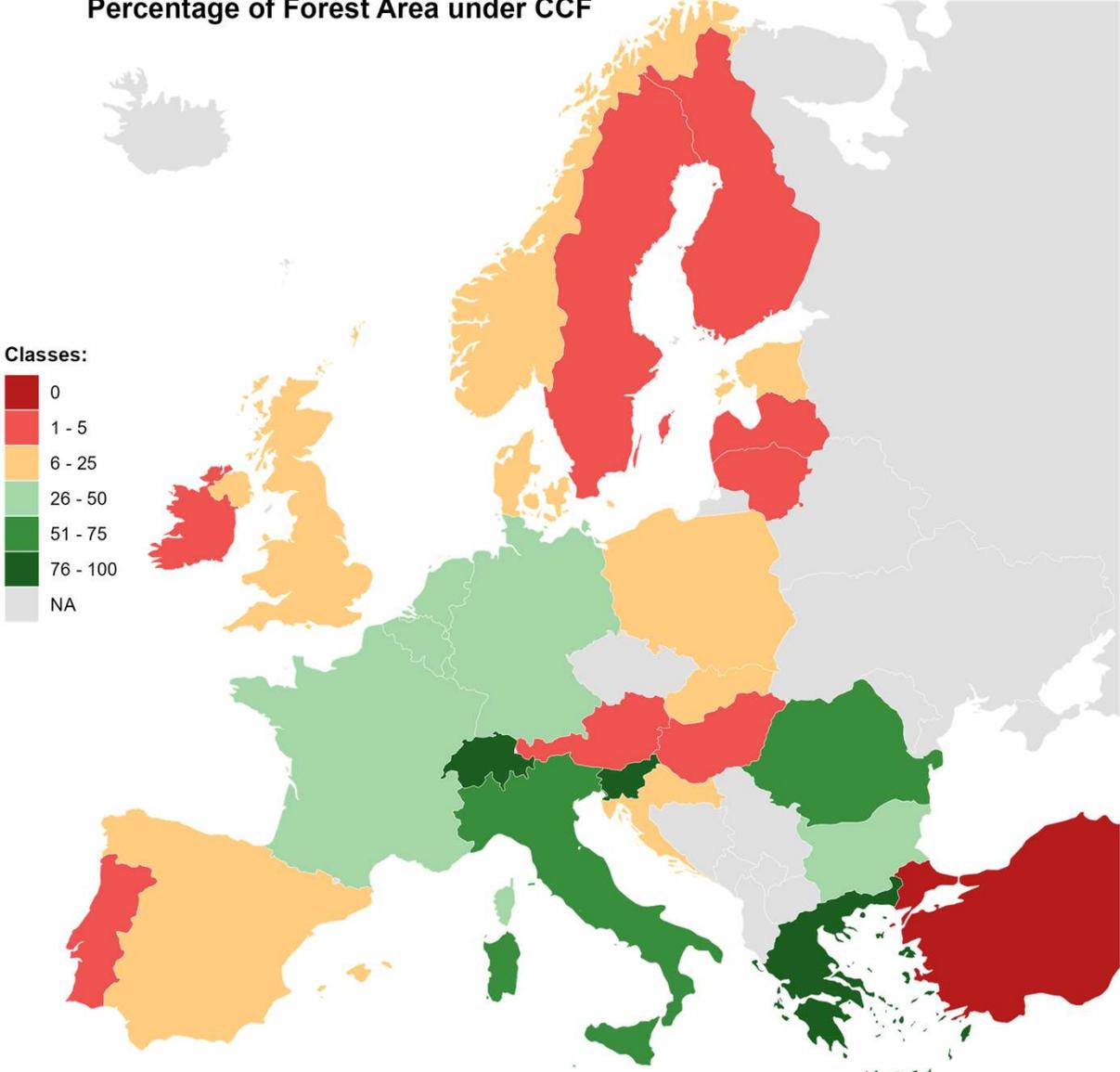


Source: Scherpenhuijzen et al., 2025



Widespread model

Percentage of Forest Area under CCF



Source: Mason et al., 2021



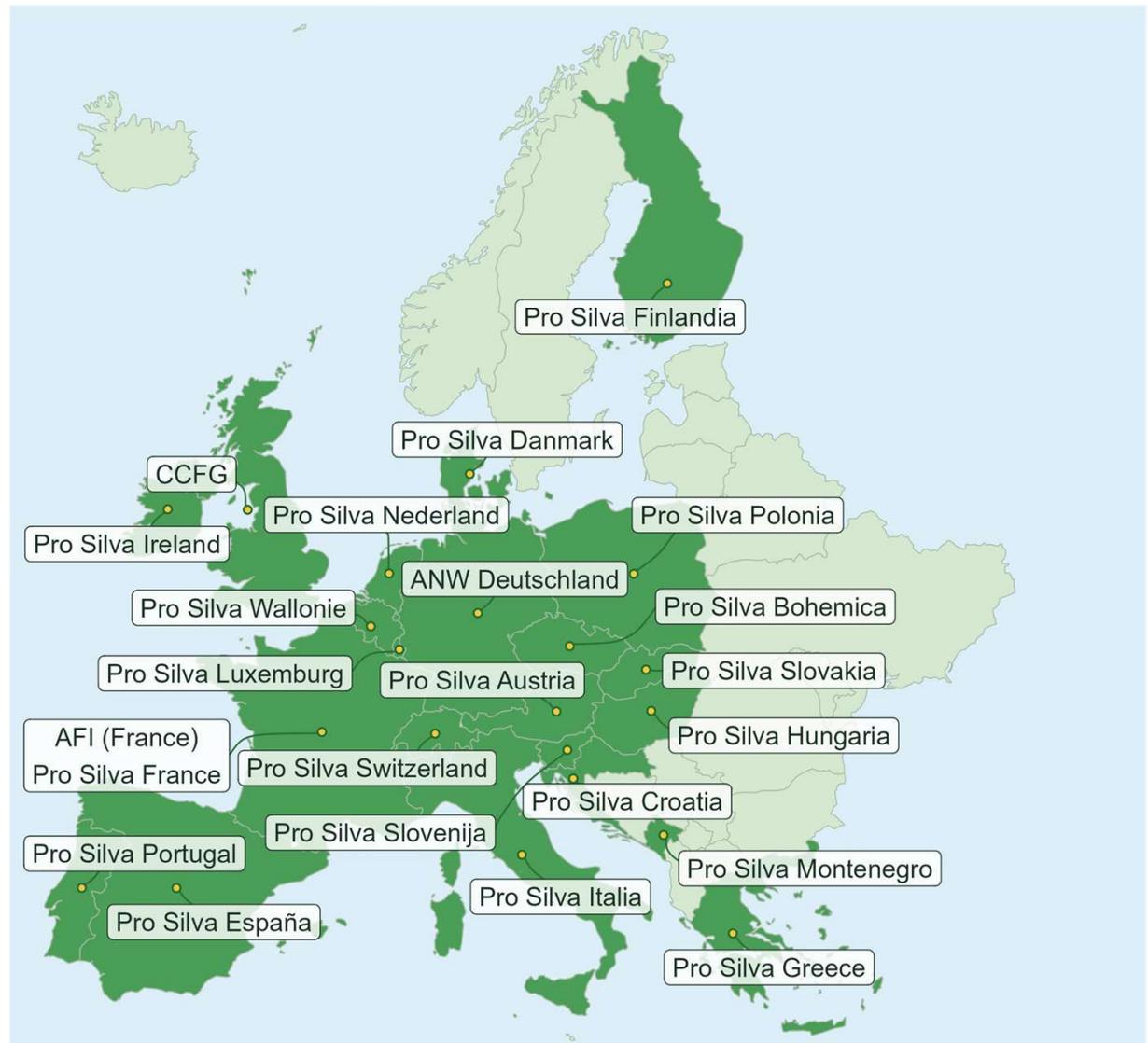
Source: Modified from Mason et al. (2021)

CCF Associations & Networks



Continuous Cover Forestry Organizations in Europe

National & regional associations linked to Pro Silva Europe and related networks

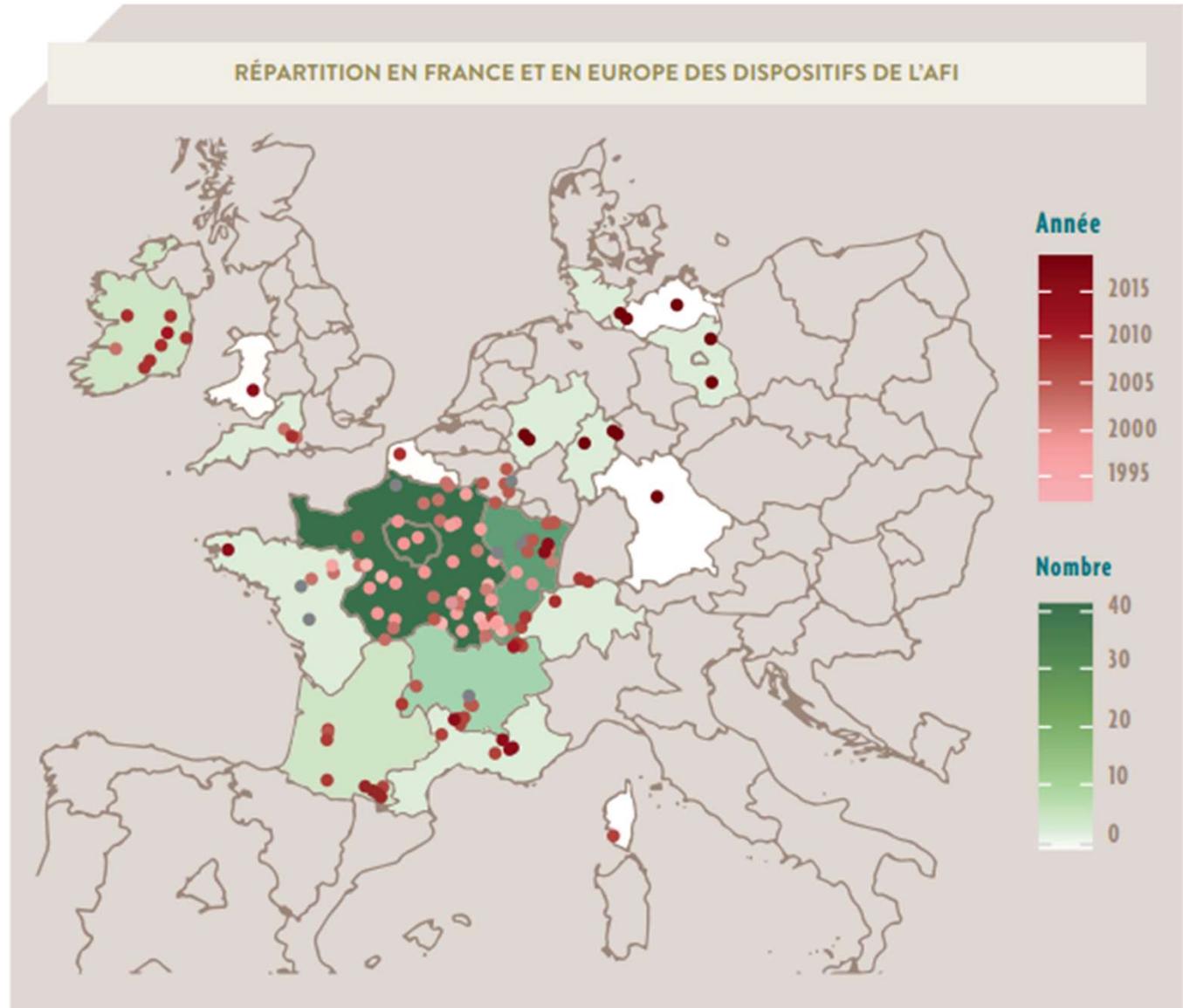


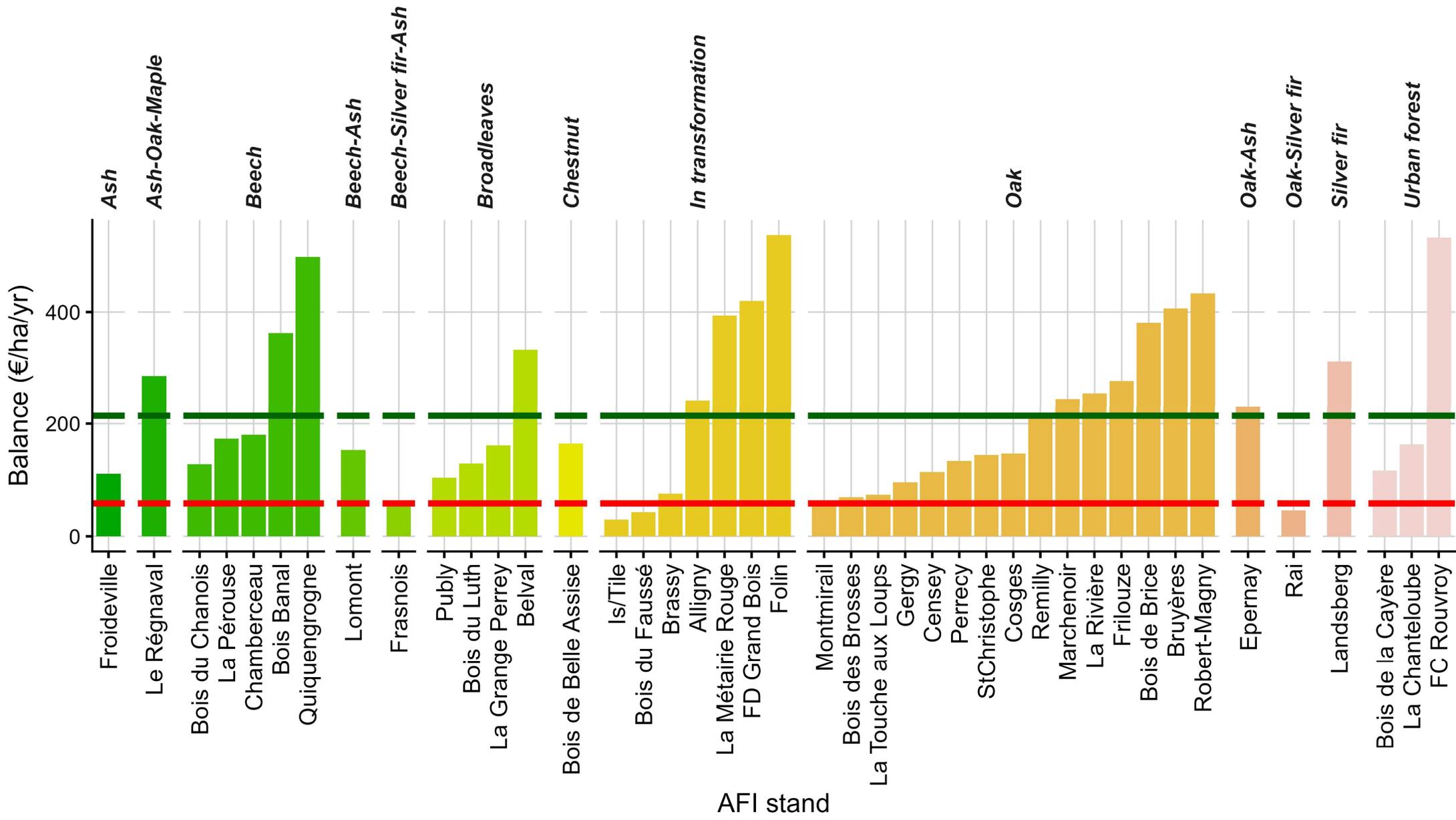
Sources: Pro Silva Europe · AFI · ANW Deutschland · CCFG and national branches

AFI Network



association futaie irrégulière







Practical Considerations for YOUR Forest

Things to consider in candidate stands

Stand structure and species composition

Good thinning track record

Advanced regeneration

Ground vegetation

Litter layer

Herbivore density

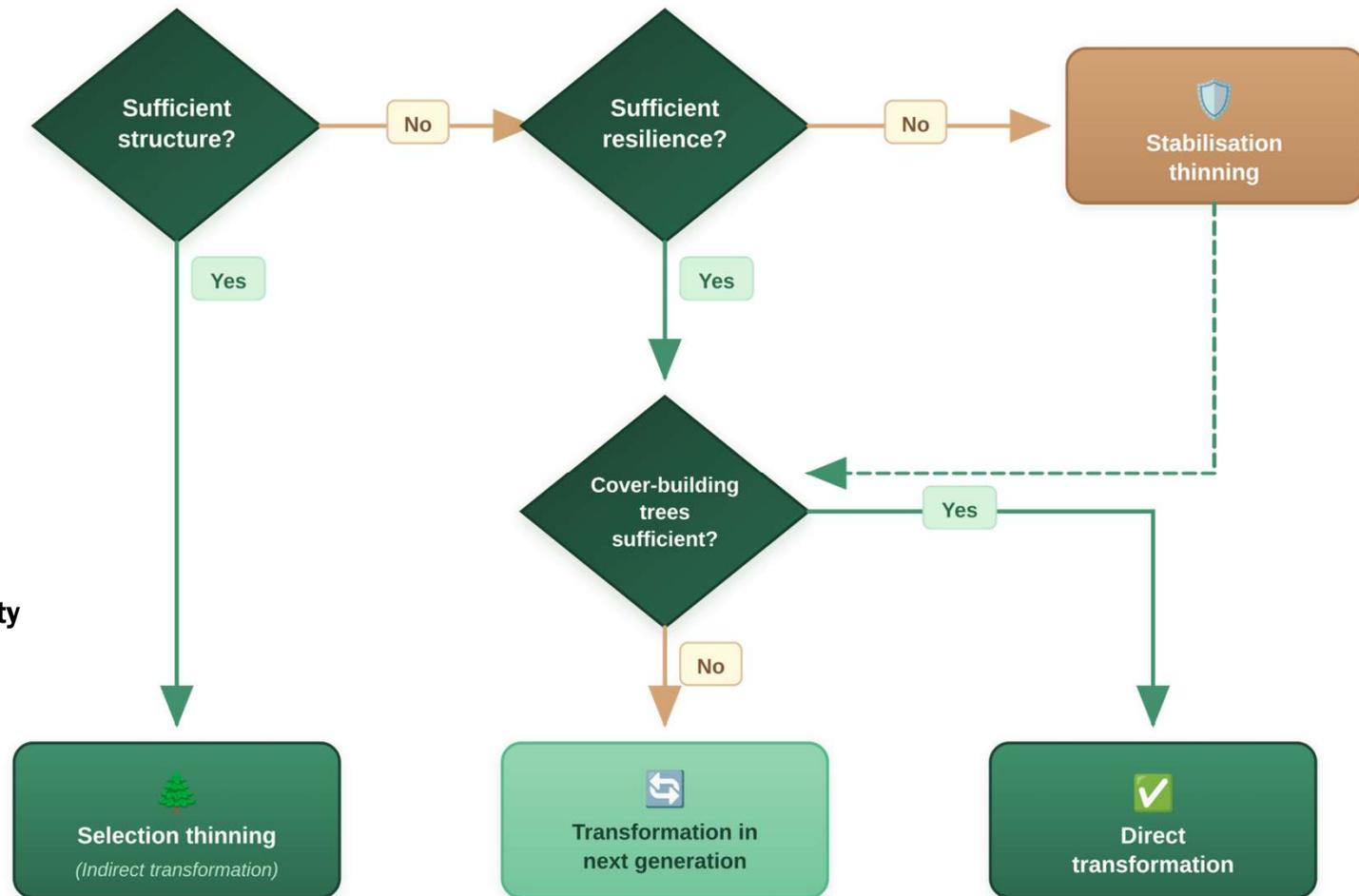
Access and topography



RFM to CCF

In addition, consider:

- **Market opportunities**
- **Risks:**
 - Wind/snow hazard
 - Diseases
- **Regeneration**
- **Crown ratio (c/h)**
 - High ratios ~ Resilience & Longevity
- **Sometimes is hard to avoid clear-felling**



Source: Adapted from Schütz (2001), Pmmerening (2024)

Thinning cycle

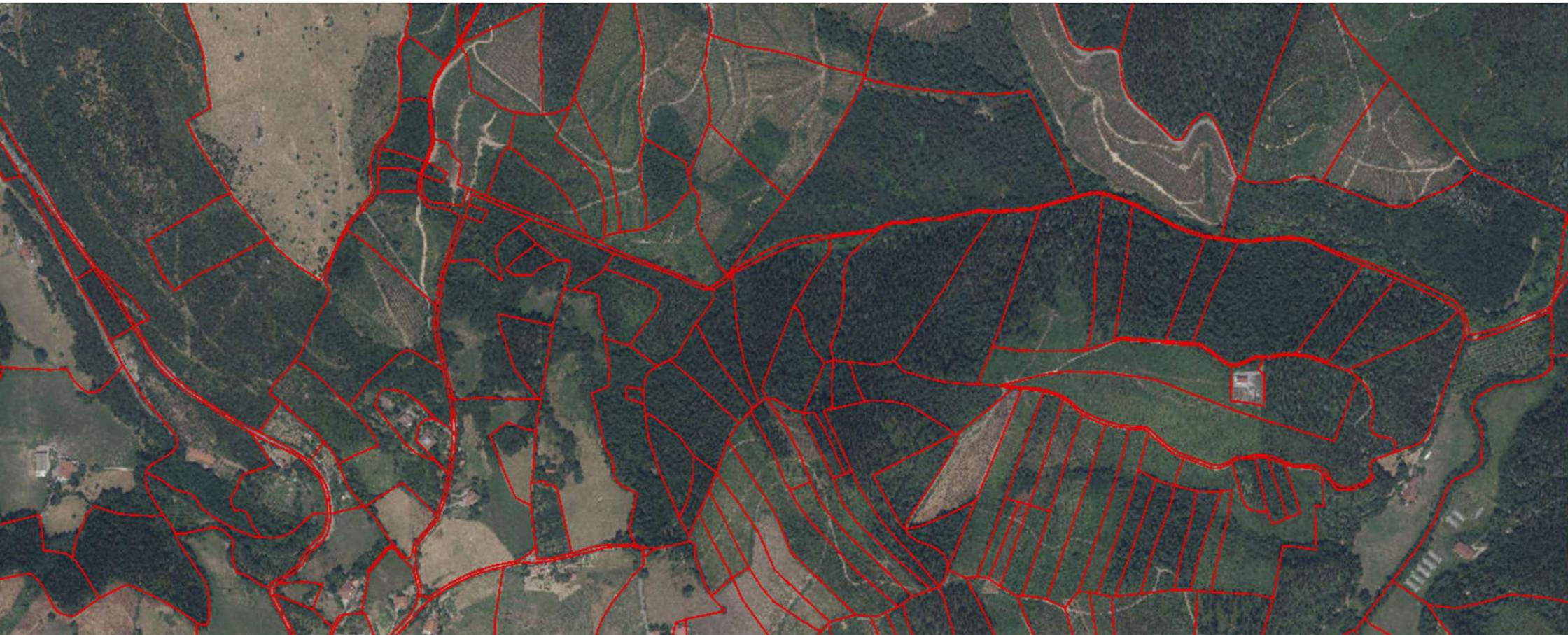
- **Target diameter substitutes age**
- **Determined by:**
 - **Management objectives**
 - **Site quality**
 - **Current condition and previous management**
- **Long cycles favor shade-tolerant species**
- **Short cycles favor shade-intolerant species**
- **Broadleaves 7-12 years**
- **Conifers 5-7 years**



Target diameter and quality

	QUALITY			
Species	A	B	C	D
Oak & Beech	75-95	75-90	55-75	ASAP if the tree has no protecting, ecological or landscape value
Beech (Risk of depreciation)	65-75	65	55	
Ash	55-65	50-55	50	
Maple	65	65	50	
Alder, birch	55	40-45	35-40	
Wild cherry	65-75	55	50	

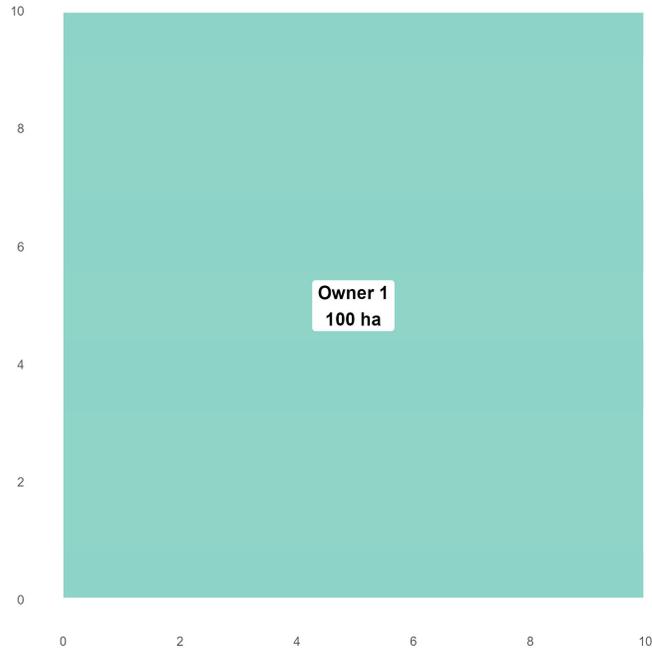




Fragmentation of ownership

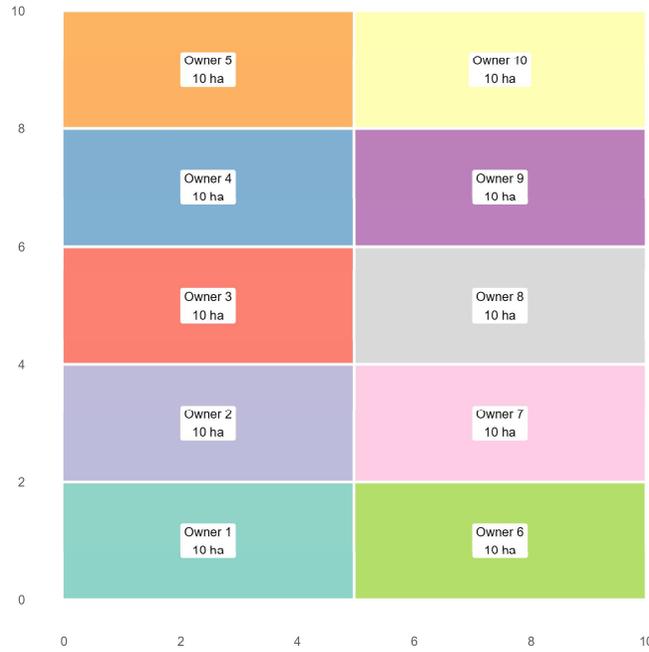
Scenario A – Single Ownership

1 parcel · 100 ha · no fragmentation



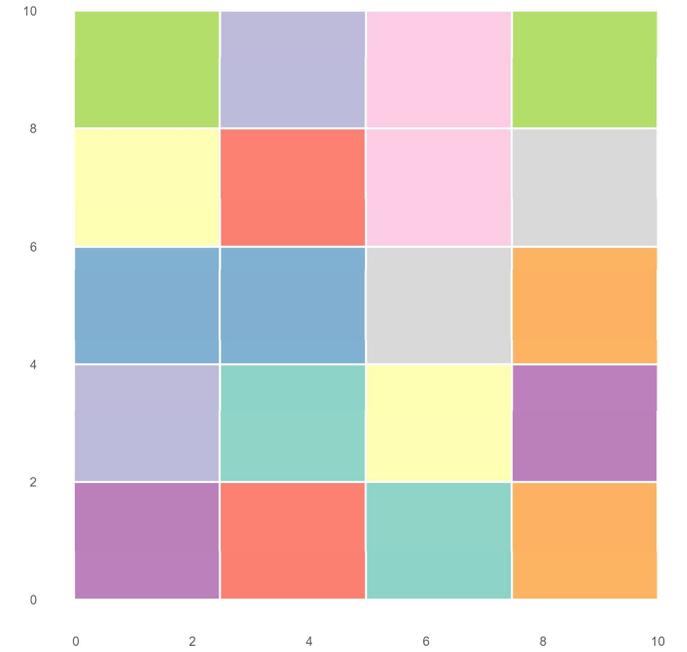
Scenario B – Medium Fragmentation (clustered)

10 parcels · ~10 ha each · spatially grouped

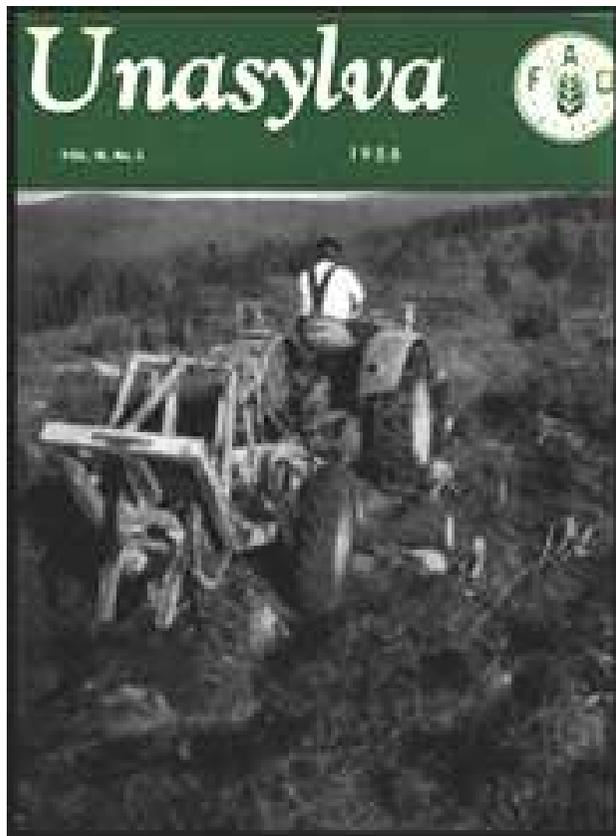


Scenario C – High Fragmentation (dispersed)

20 parcels · ~5 ha each · same colour = same owner, scattered across forest



Fragmentation of ownership



FAO, 1956. Forestry Associations,
Unasyva, Vol.10 No. 2



- **Cost/Benefit relationship changes with scale**
- **A step further in associationism:**
 - **Joint management of fragmented ownerships**
 - **Further reduction of costs**
- **The solutions are NOT new, and have long been applied to RFM**
- **The need of a European network of entities managing private forests under CCF (*)**

**Fragmentation of
ownership**



**Herbivore
density**

Permanent extraction racks

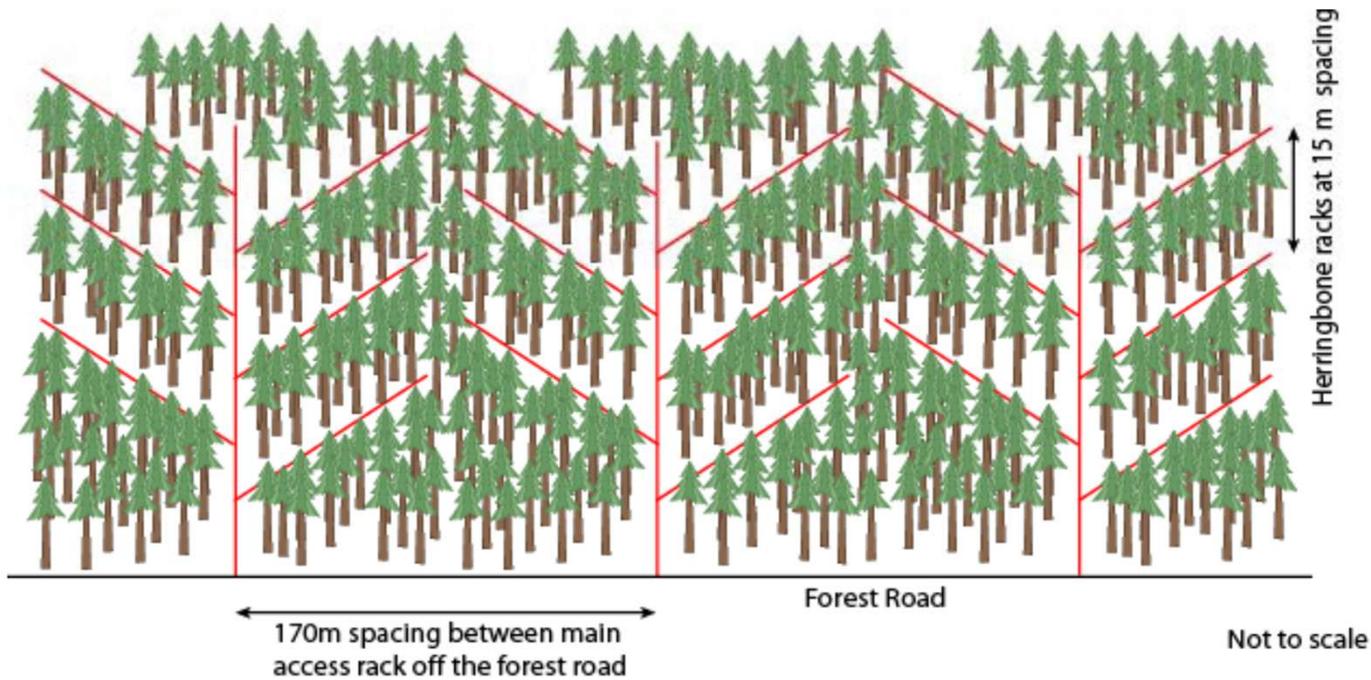


Figure 7 Herringbone racking as a systematic thinning method



Skill gaps – Get yourself trained!

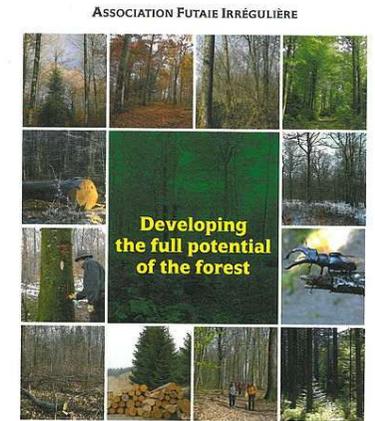
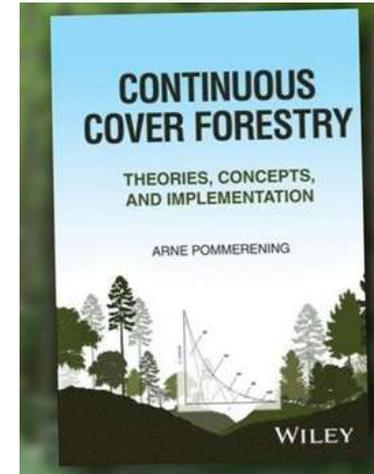
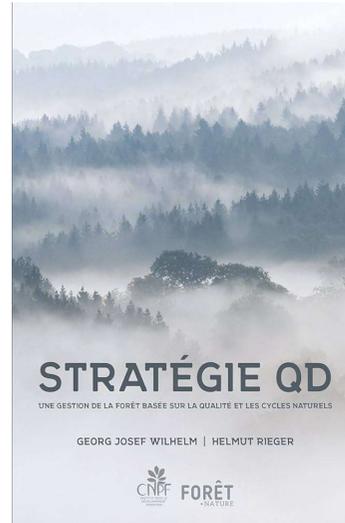
- **Tree selection and marking**
 - Thinning cycles
- **Planning of harvesting:**
 - Extraction racks
 - Sale strategies
- **Monitoring transformation**
- **Regeneration strategies**



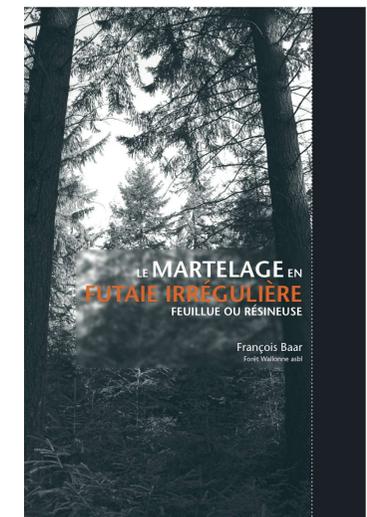
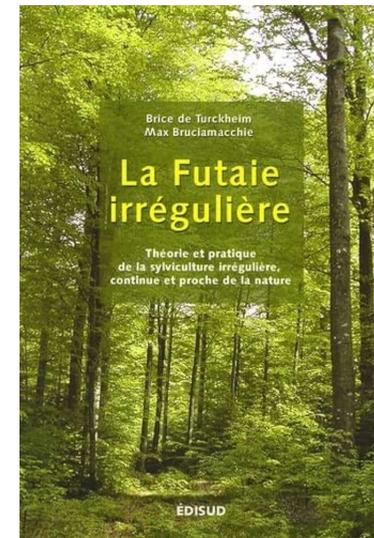
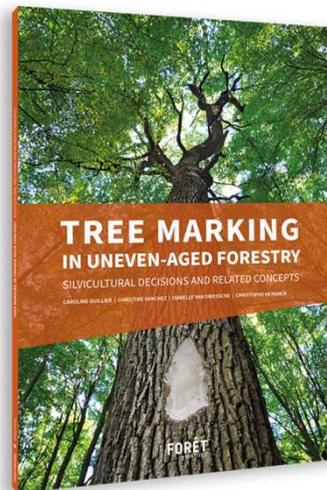


Summary – Learn more

Further info



Management of Irregular Forests
Principle authors: Roland Susse, Charles Allegretti, Max Bruclamacchie and Roland Burrus
English translation: Phil Morgan





www.selviaula.com

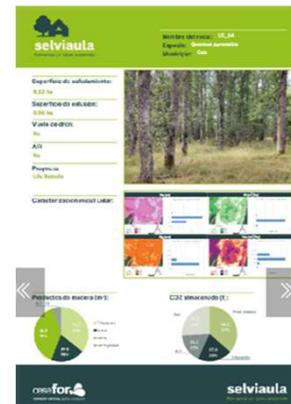
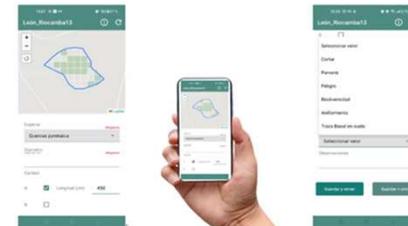
By
cesefor****
CORAZÓN FORESTAL, espíritu investigador

Services provided by Selviaula

- **Web contents:**
 - **Access to e-learning platform**
 - **Documentary database**
 - **Online training capsules**
 - **Travel blog and newsletter**
- **Marteloscope training**
- **Innovation and monitoring in our Open Forest Space**
- **Qualified personnel job board**
- **Free use of Sisilv app. for markers**
- **Technical forum**



App "señalador" para toma de datos
Permite trabajo en campo offline



Take-home messages

1. You *can* lower investment costs and increase resilience without sacrificing profitability

2. “The difficulty lies not so much in developing new ideas as in escaping from old ones”

John Maynard Keynes





Q&A

Iñaki Etxebeste Larrañaga

inaki.etxebeste@cesefor.com

www.linkedin.com/in/iñaki-etxebeste-58570b2a

cesefor | Forestry & Climate Change Researcher | PhD in Forestry



Thank you for your attention



By
cesefor.
CORAZÓN FORESTAL. www.cese.org.ar



***Be wise
Be innovative
Be brave
Be Laurus***

By



Funded by
the European Union

www.laurusnetwork.eu

