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INSTITUTE FINLAND

Closer to nature forestry in the boreal region -options & obstacles

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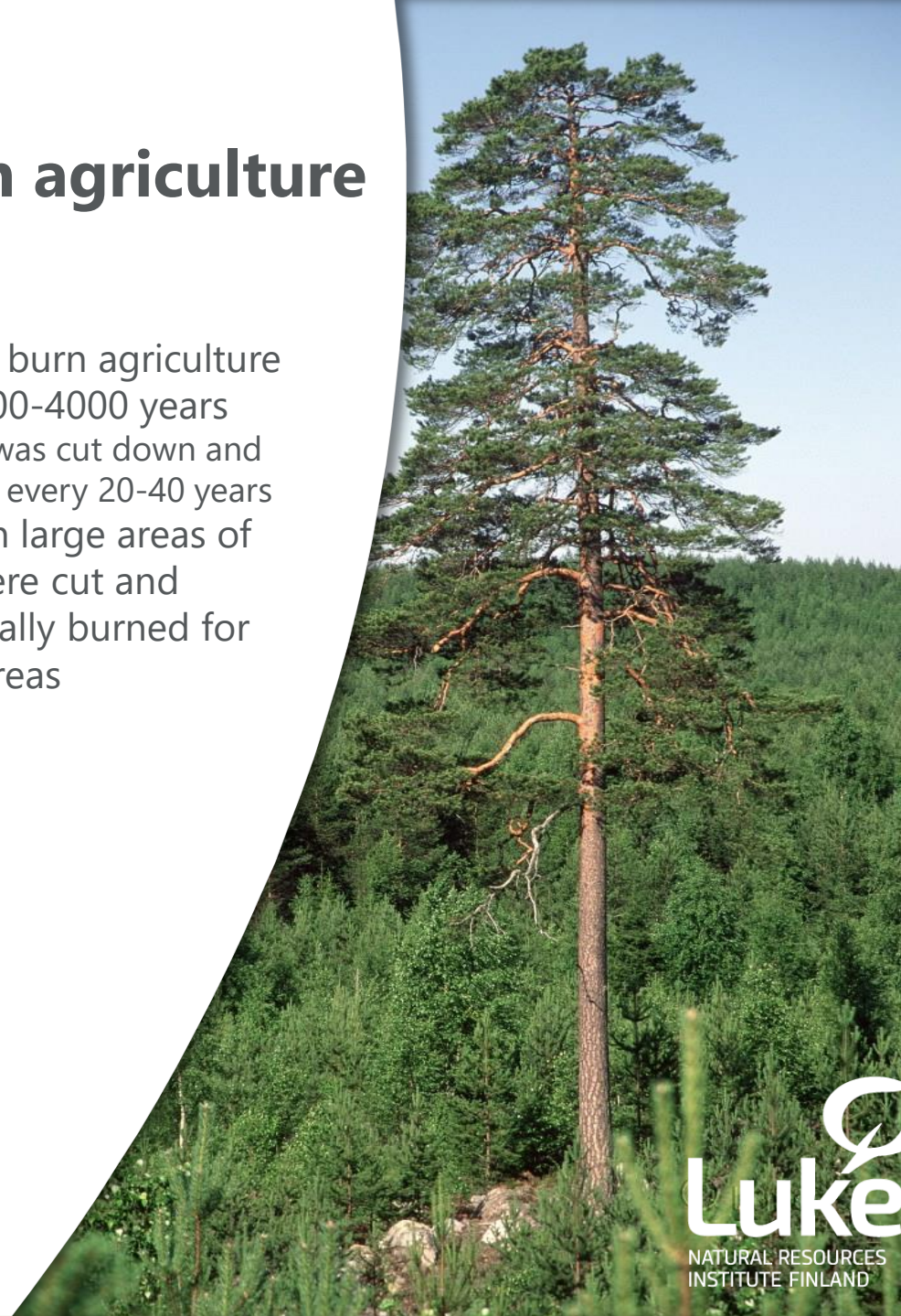
Historical forest use: slash and burn agriculture

Eero Järnefelt: ”Kaski”

Slash and burn agriculture lasted 3000-4000 years

- Forest was cut down and burned every 20-40 years

In Sweden large areas of forests were cut and occassionally burned for grazing areas

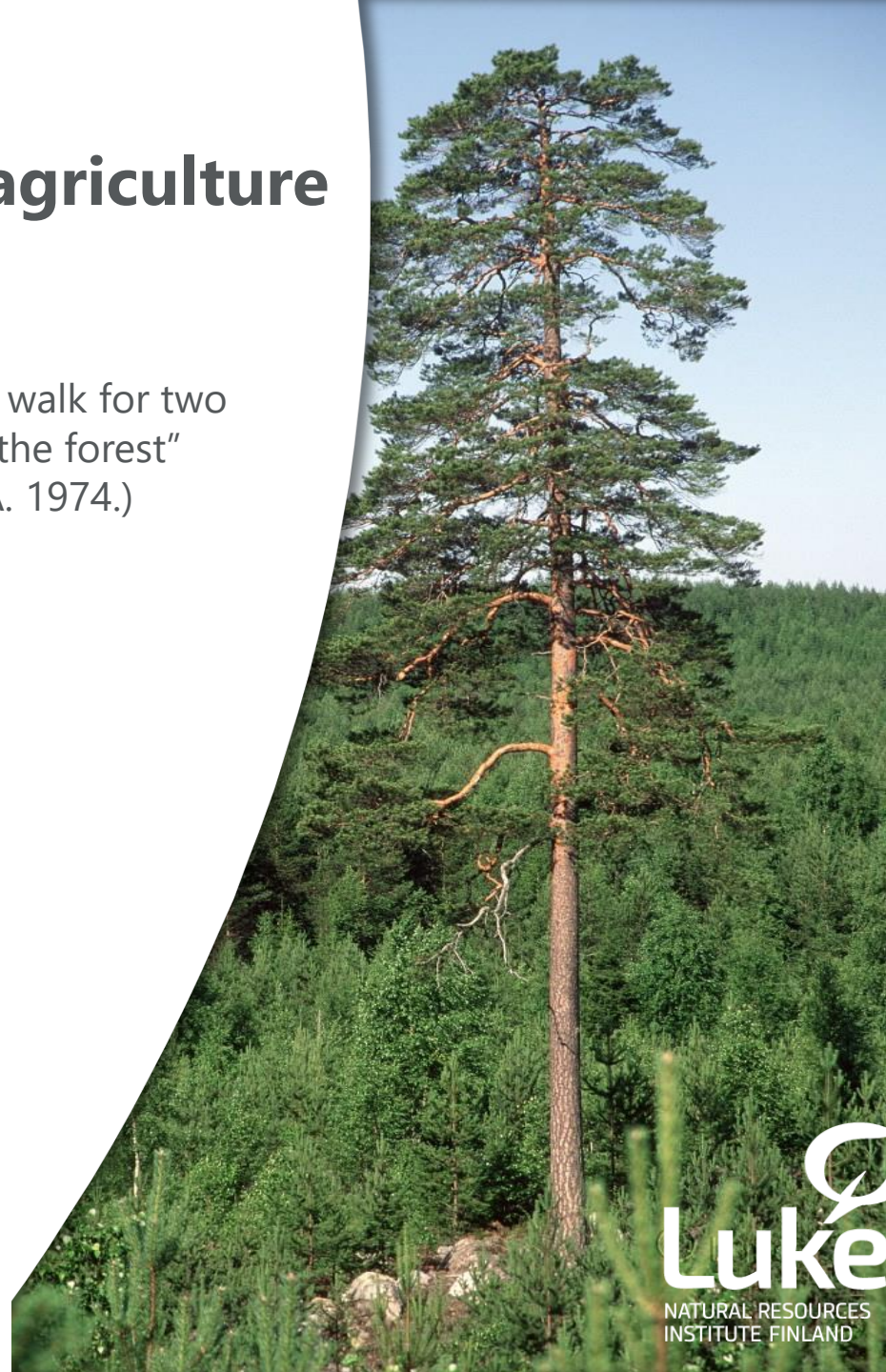


Historical forest use: slash and burn agriculture

Kuv. 9. Tiheään kaskettuja maita. Maat ovat alkujaan olleet ainakin mustikka-tyypin maita, nykyjään ovat ne lähinnä puolukka-tyyppiä. Eri ikäisten kaskiahojen väliin jääneet leppä- ja koivujuotit jakavat alan eri osastoihin. Mäntyjä on viime aikoina säästetty. Ahkeran laiduntamisen takia ovat 6-vuotiset abot vielä aukeita. — Heinävesi, Petruma, Koiraharju.

Photo: Heikinheimo 1915: *Kaskiviljelyksen vaikutus Suomen metsiin*

"Man had to walk for two days to find the forest" (*Soininen, A. 1974.)



Soininen, A. 1974. Vanha maataloutemme. Maatalous ja maatalousväestö Suomessa perinnäisen maatalouden loppukaudella 1720-luvulta 1870-luvulle. Suomen maataloustieteellinen seura, Helsinki. Maataloustieteellinen aikakauskirja 46. 459 s.

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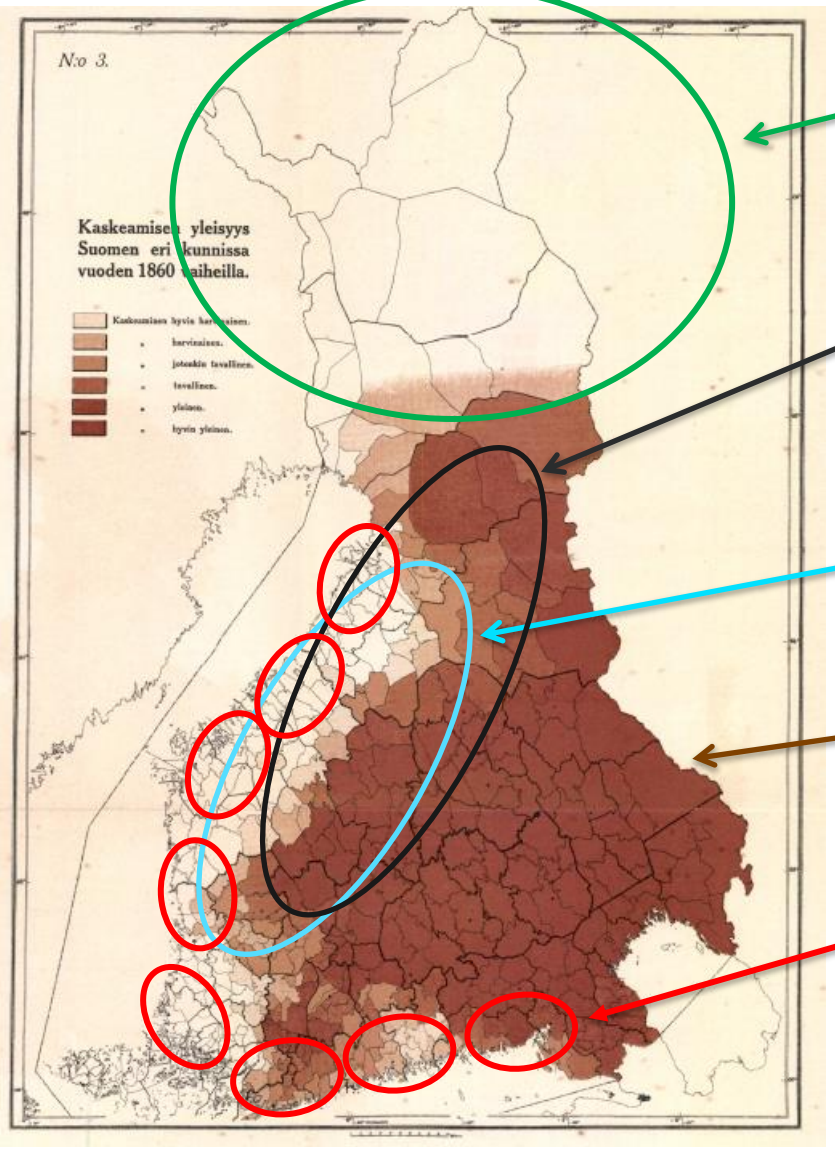
Historical forest use



Area of intact forests?

Tar production area in 1700 – beginning of 1900's

Nutrient rich peatlands ditched for agriculture use during hundreds of years

Slash and burn area in 1860

Sawnmills and shir building on 1750-luvulla

Heikinheimo 1915: *Kaskiviljelyksen vaikutus Suomen metsiin*

Historical forest use

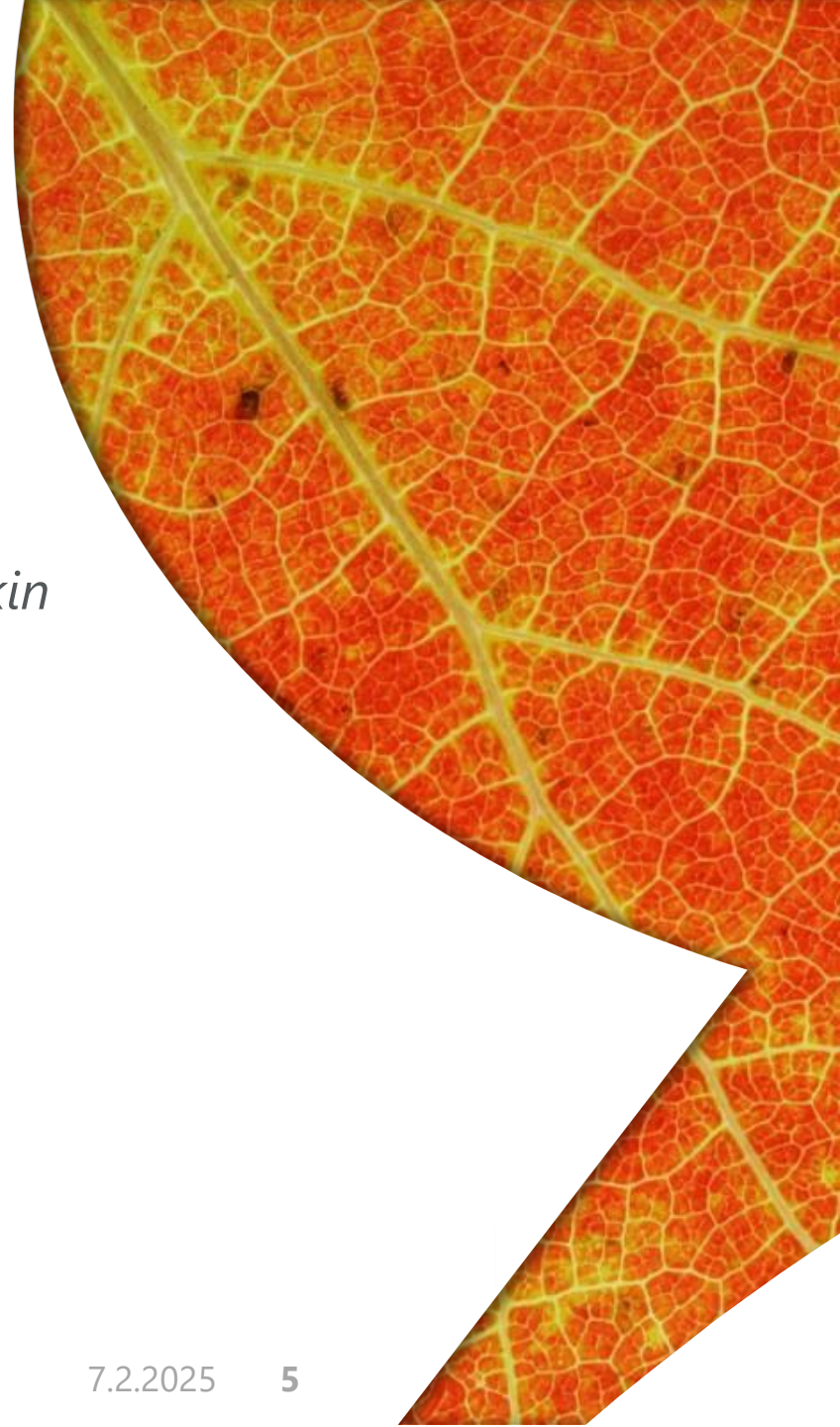
Taksaattori Karl Brander kirjoitti 1890-luvulla Lapin kruunumetsien kartoitusretkellä:

"Metsän keski-ikä on 250 vuotta. Mistään uudelleen kasvusta voi tuskin puhua, sillä ne harvat nuoret puut, joita löytyi, olivat melkein kaikki porojen turmelemia."

(Sandström ym. 2021: Savuinen savotta)

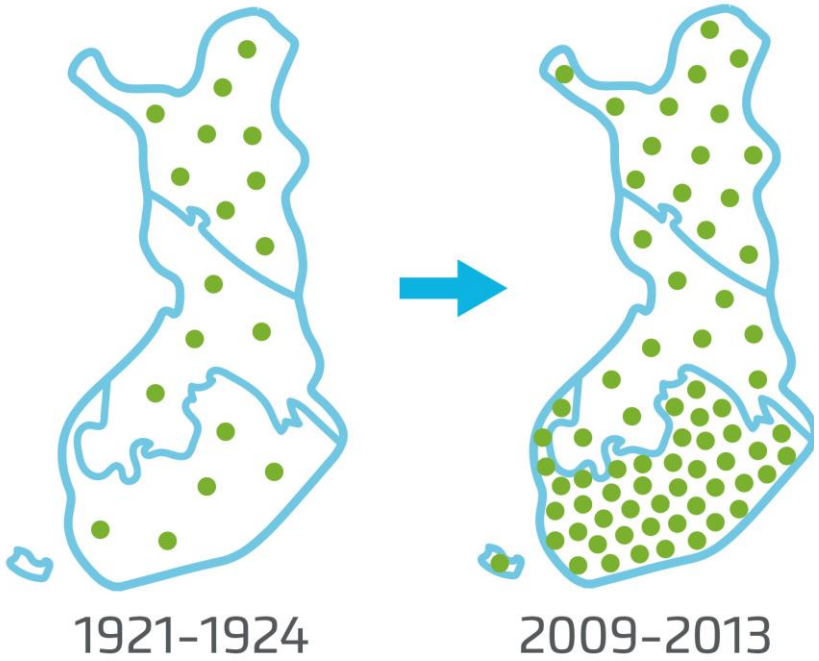
Forest inventor Karl Brander wrote in the 1890s on a mapping expedition in the crown forests of Lapland:

"*The average age of a forest is 250 years. There is hardly any sign of regrowth, as the few young trees that were found were almost all damaged by reindeer.*"



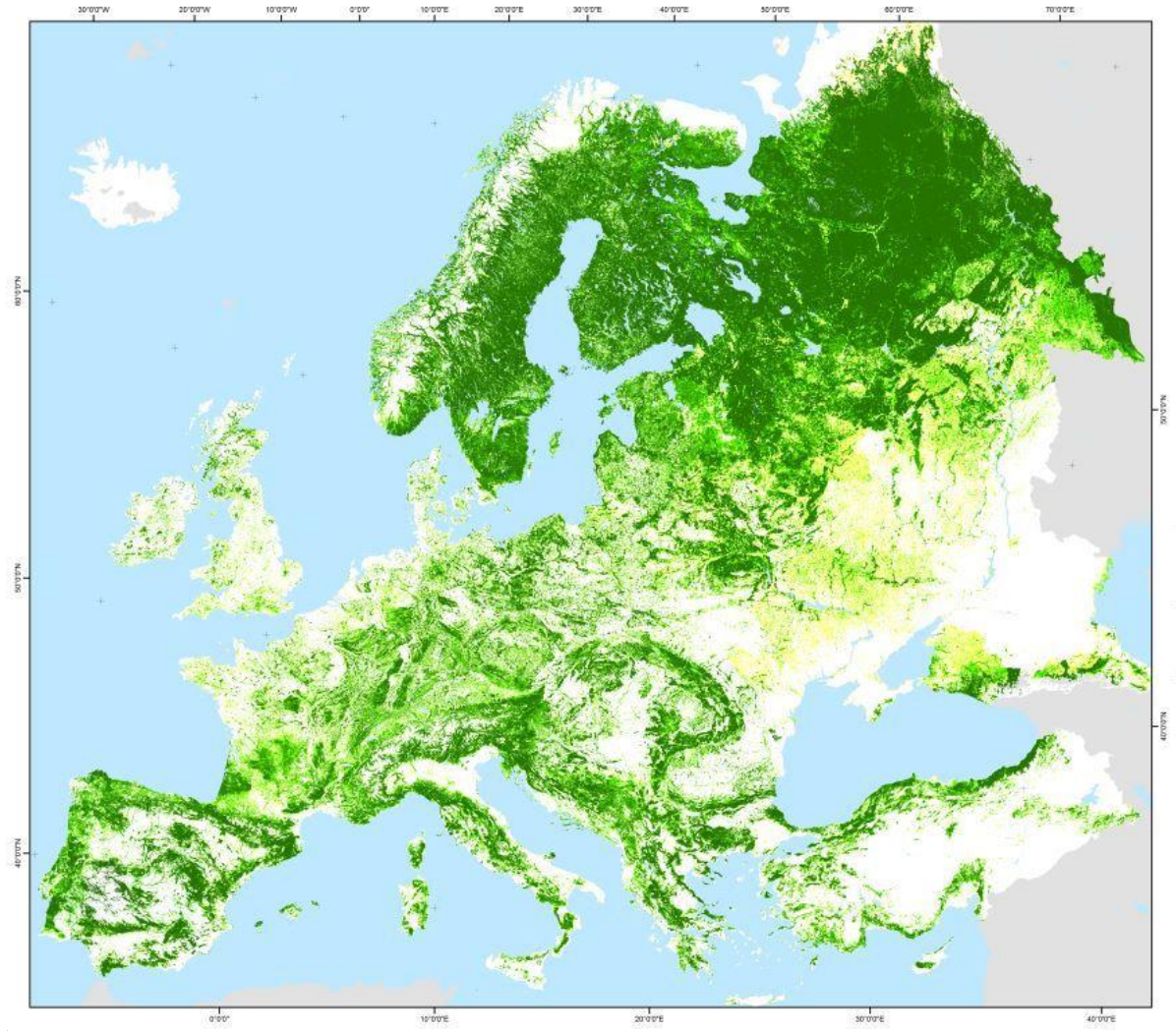
Large trees (diam. 40+ cm) in NFI1 vs. NFI11

The amount of large trees have multiplied (+325%)



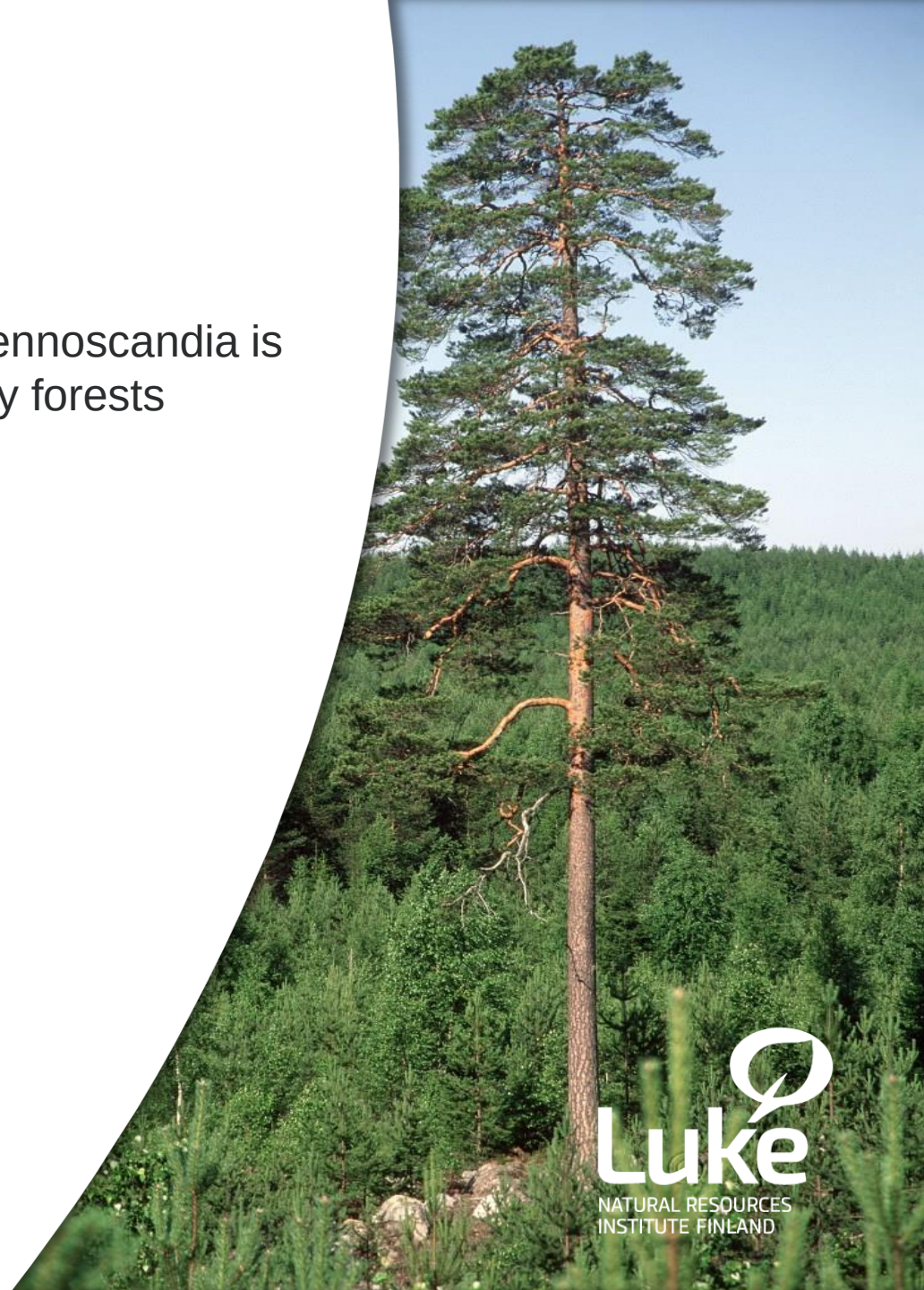
Source: Henttonen, Nöjd & Mäkinen 2020. European Journal of Forest Research. 139:279-293.

European forest resources



Most of Fennoscandia is covered by forests

Source: Päivinen et al. 2003, Schuck et al. 2002, Kempeneers et al. 2011



Research and method development in forestry:

Breeding programmes

Silvicultural methods: site preparation

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Research and method development in forestry:

Silvicultural methods: sowing, planting, thinnings


Photo: Metsälehti

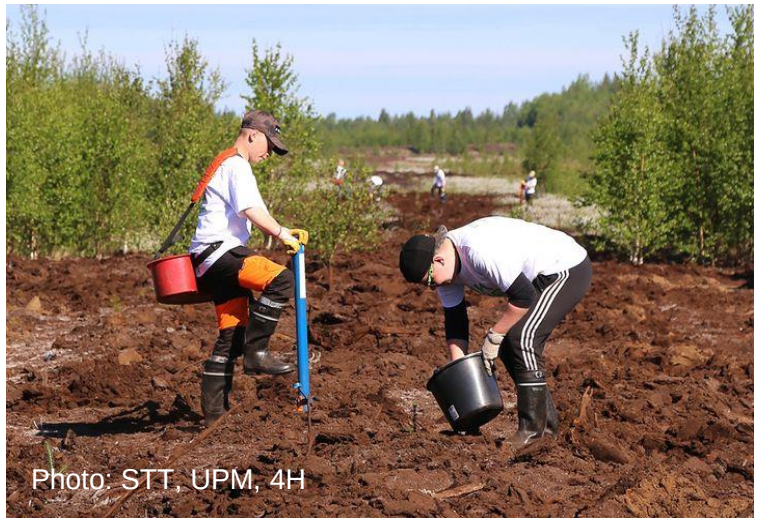
Photo: STT, UPM, 4H

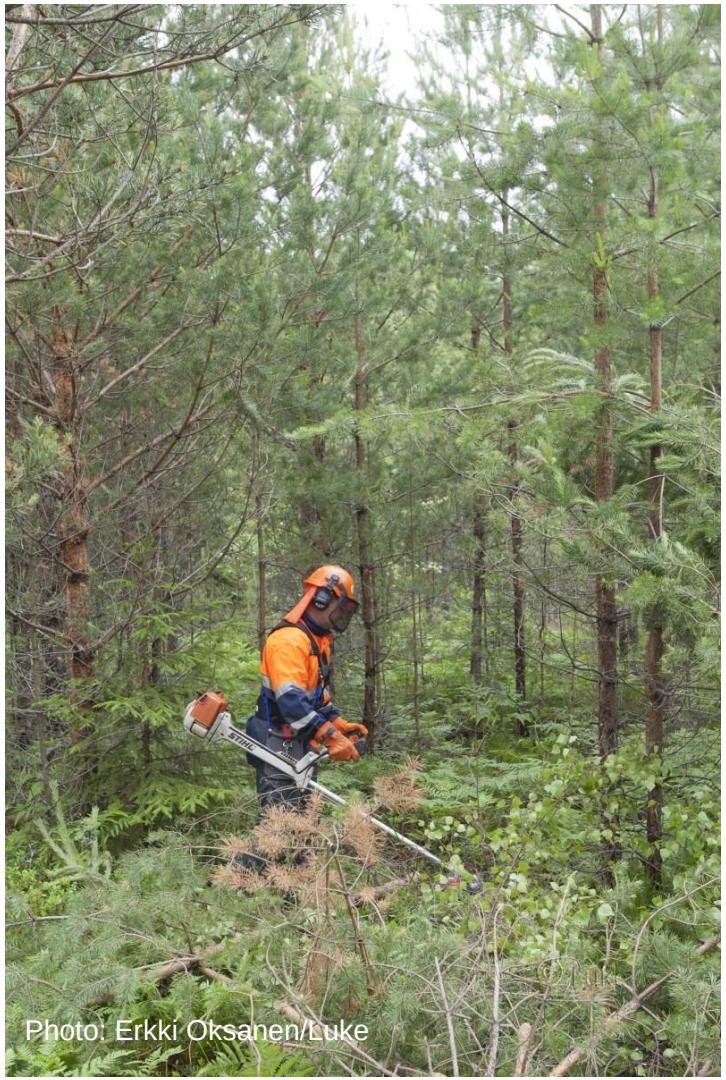
Photo: Erkki Oksanen/Luke

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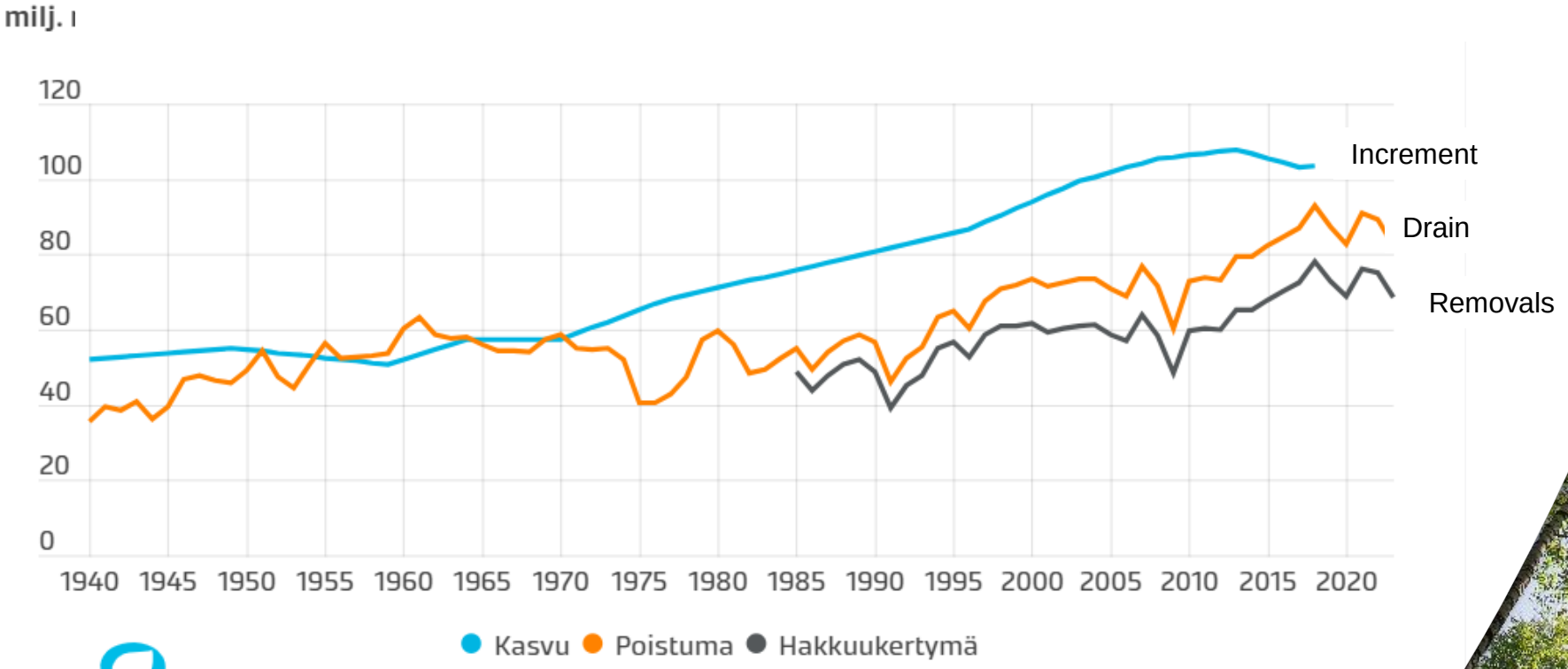
Timber use on sustainable level since 1970’s

Total annual roundwood removals, increment and drain of growing stock in Finland 1940-2023



Source: OSF: Natural Resources Institute Finland, Total roundwood removals and drain.

New sustainability goals

UN Sustainable development goals

Source: https://sdgs.un.org/goals

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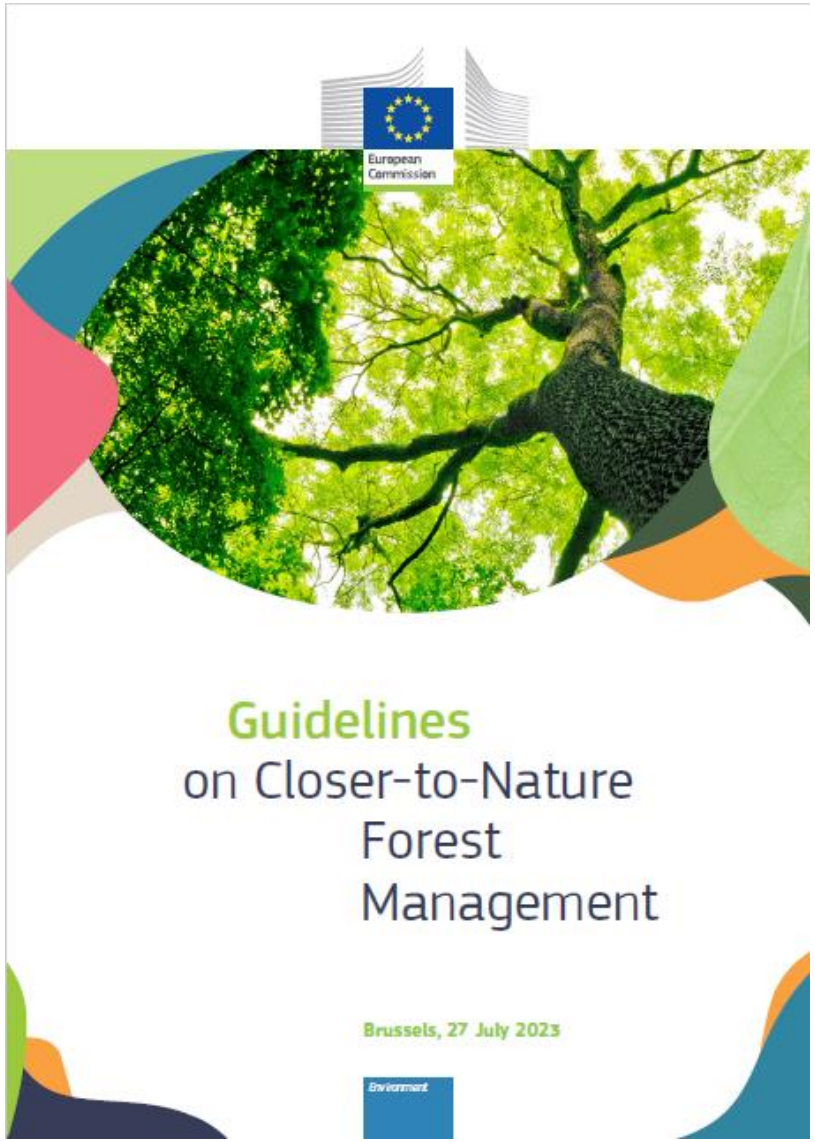
Would Closer to Nature Foresty help?



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How nature does it?

Photo: Pasi Rautio, Luke

Disturbance is needed: forests regenerate usually after a forest fire or storm damage
- Especially light demanding species benefit

How nature does it?

60 ha prescribed burning area in Northern Finland

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Introduction of the book: Continuous Cover Forestry in Boreal Nordic Countries

4th December at 12-15 CET in Helsinki EU Office , Brussels

Research manager Johanna Routa, Luke

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Continuous cover forestry: small gap cuttings

Especially for pine and birches (light demanding species)

Gap cuttings remove only a few trees per gap, creating small openings in the beginning, which are slightly extended in later cuts. (Brunner et al. 2025 in: Rautio et al. (eds): Continuous cover forestry in boreal nordic countries)

Continuous cover forestry: selection cuttings

Especially for spruce (shade tolerant species)

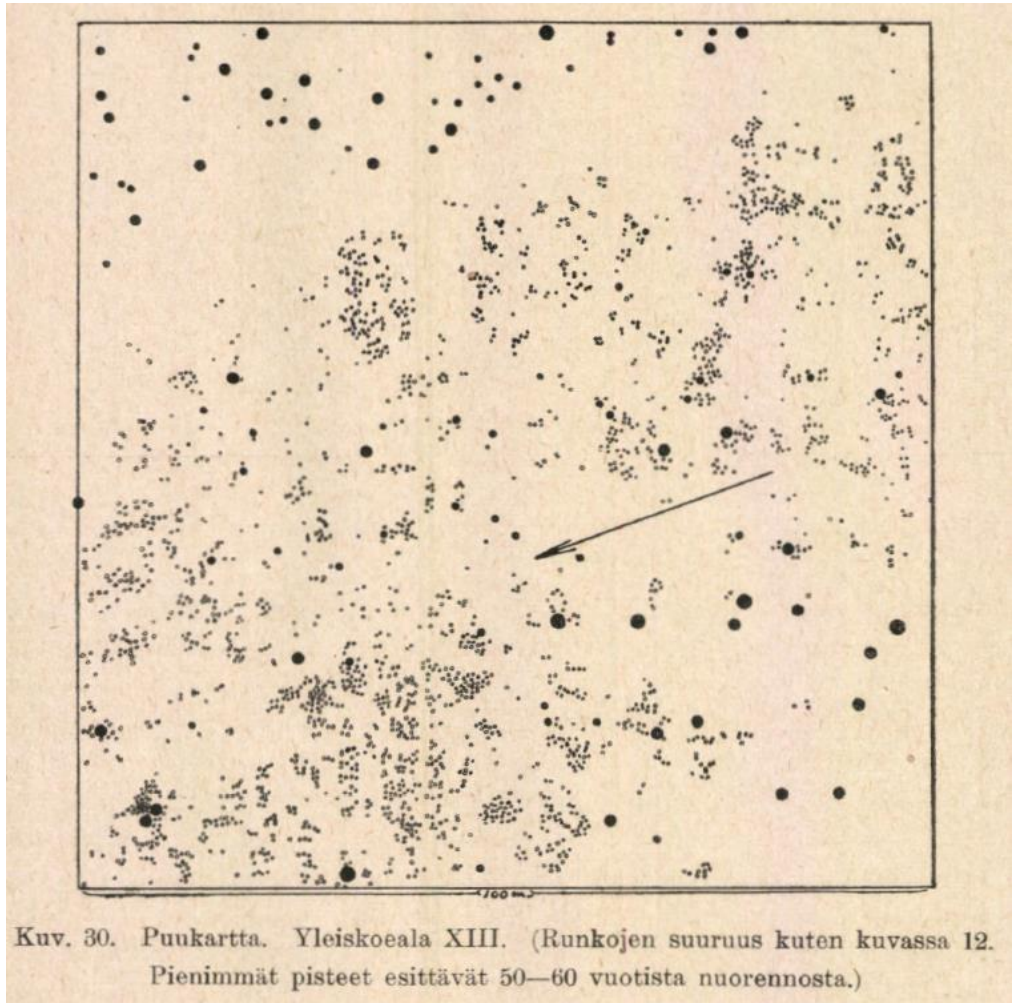
A stand managed with the selection system at two points in time. Even though the structure of the stand has changed due to tree growth and removals, the visual impression is near constant. (Brunner et al. 2025 in: Rautio et al. (eds): Continuous cover forestry in boreal nordic countries)

Challenges of CCF

Natural regeneration affected by mature trees

- Provide seed source
- Compete with seedlings

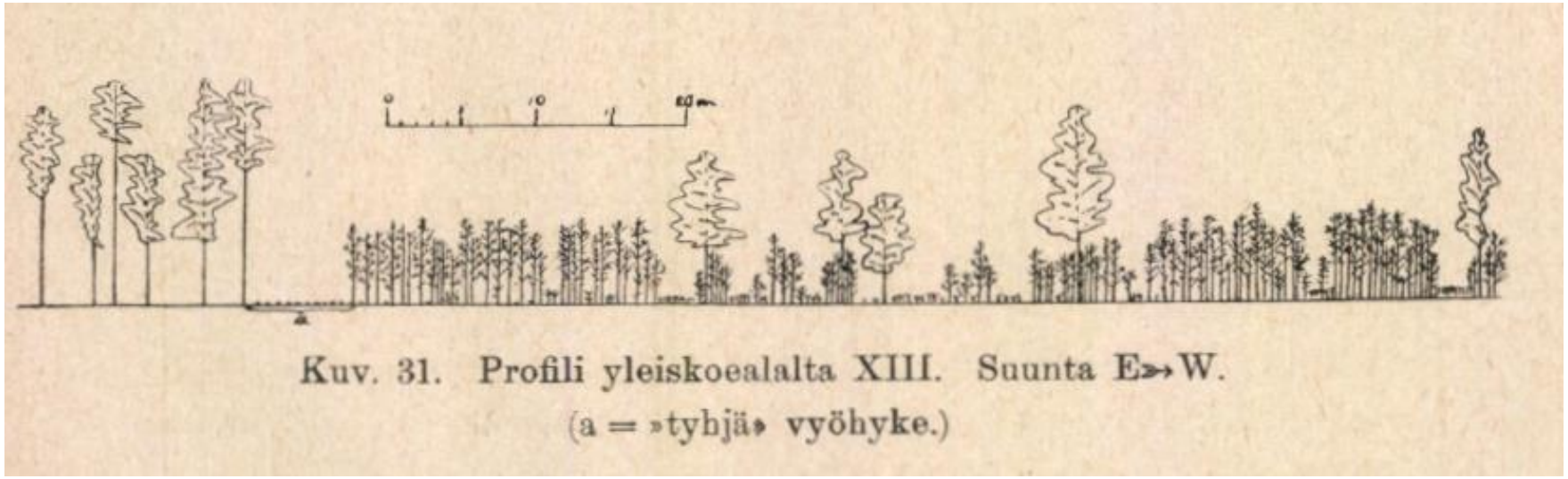
Natural regeneration in CCF



Kuv. 30. Puukartta. Yleiskoeala XIII. (Runkojen suuruus kuten kuvassa 12. Pienimmät pisteet esittävät 50—60 vuotista nuorennosta.)

Source: Aaltonen 1919: Kangasmetsien luonnollisesta uudistumisesta Suomen Lapissa. Metsätieteellisen koelaitoksen julkaisuja. 1: 1-319.

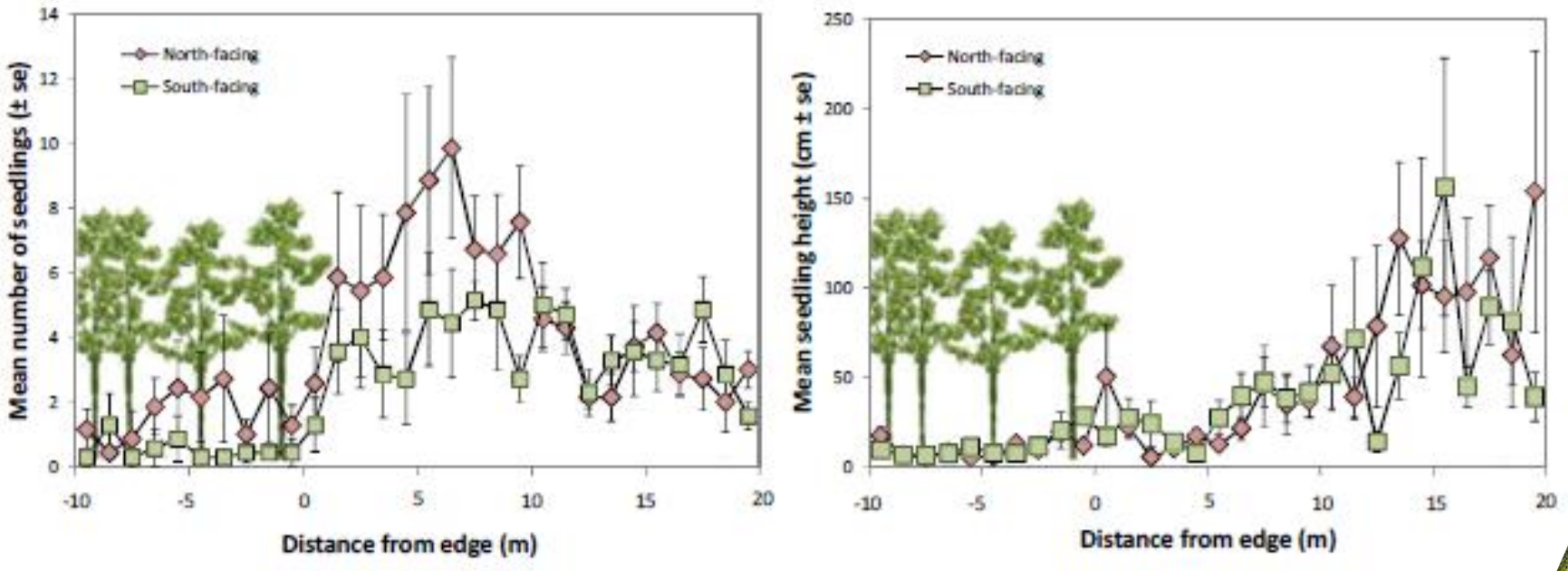
Natural regeneration in CCF



Kuv. 31. Profili yleiskoealalta XIII. Suunta E→W.
(a = »tyhjä» vyöhyke.)

Source: Aaltonen 1919: Kangasmetsien luonnollisesta uudistumisesta Suomen Lapissa. Metsätieteellisen koelaitoksen julkaisuja. 1: 1-319.

Natural regeneration in CCF



Spatial patterns of the number of pine seedlings per m−2 and their mean height (cm) along 30-m transects going from inside the forest stand, out into forest gaps. On the *x*-axis, 0 m denotes the forest edge. The forest edges faced either north or south.

Source: Axelsson et al. 2014: Belowground Competition Directs Spatial Patterns of Seedling Growth in Boreal Pine Forests in Fennoscandia. Forests.

Challenges of CCF

Scots pine

- Needs light to regenerate
- Spruce “take over” → hard to create several canopy layers with pine

Restrictions for CCF

Photo: Pasi Rautio, Luke

200 year old pine forest: regeneration mainly by spruce

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Challenges of CCF

Norway spruce

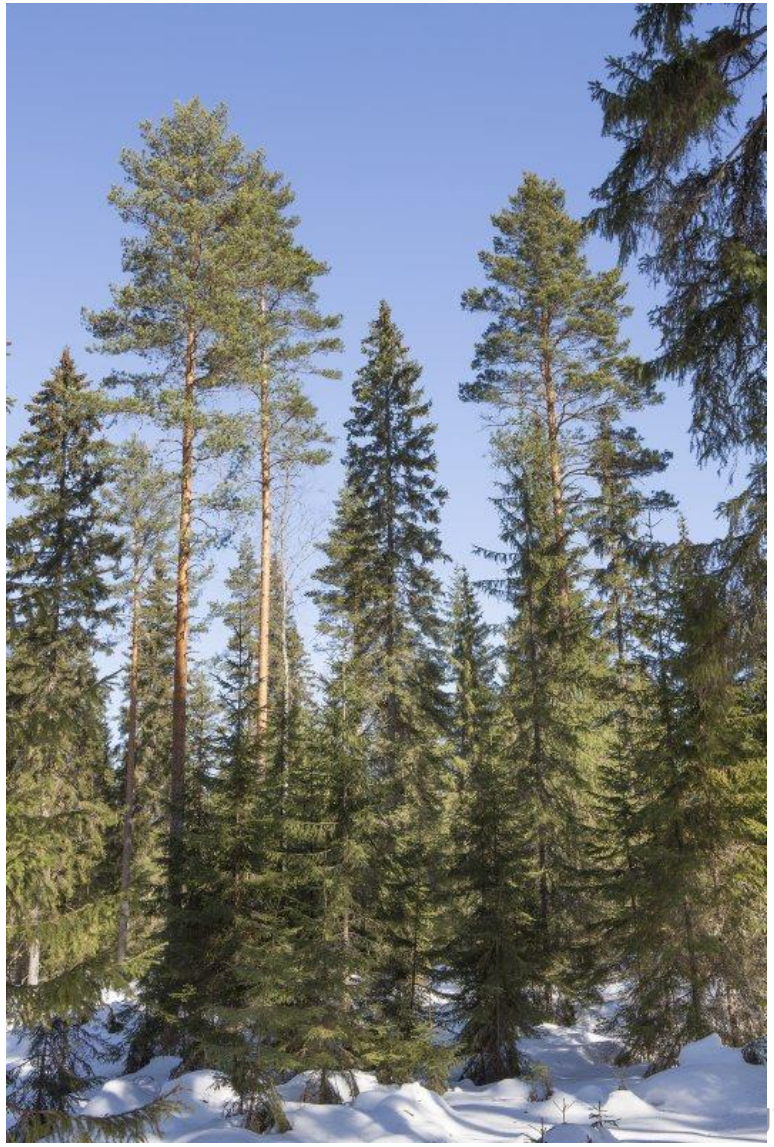
- Risk for root rot → forest operations only wintertime (<0ºC and preferably snow cover)
- Regeneration in too dense forest

Challenges of CCF

Photo: Erkki Oksanen, Luke

Basal area 25m2 after cutting: very weak regeneration in 30 years

Challenges of CCF



Basal area below 15m2 after cutting:
regeneration and growth on acceptable level

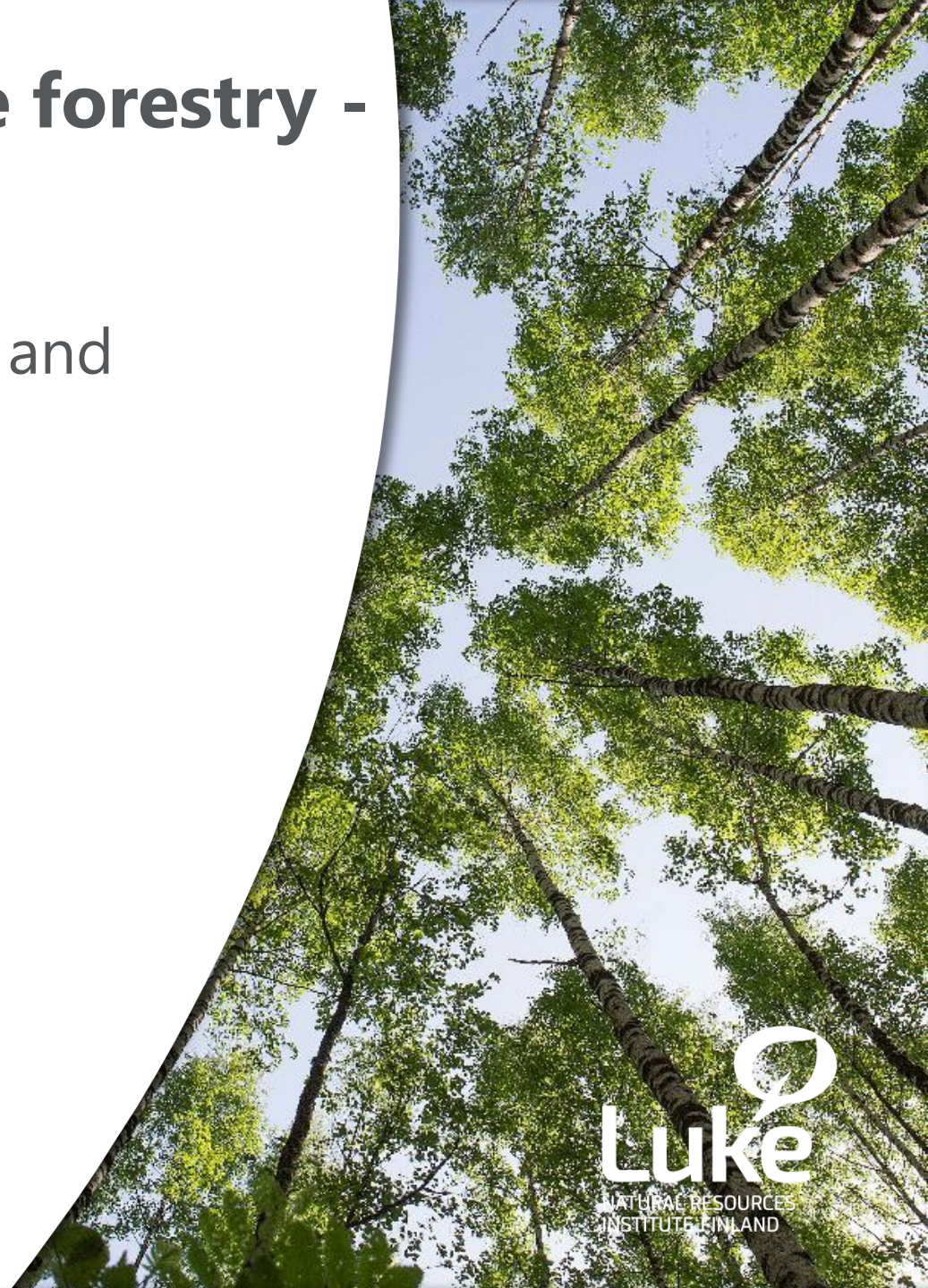
Challenges of CCF

Biodiversity

- CCF doesn’t produce dead wood → retention tree forestry still needed to safe old trees and deadwood

Challenges of CCF/Closer to nature forestry - terminology

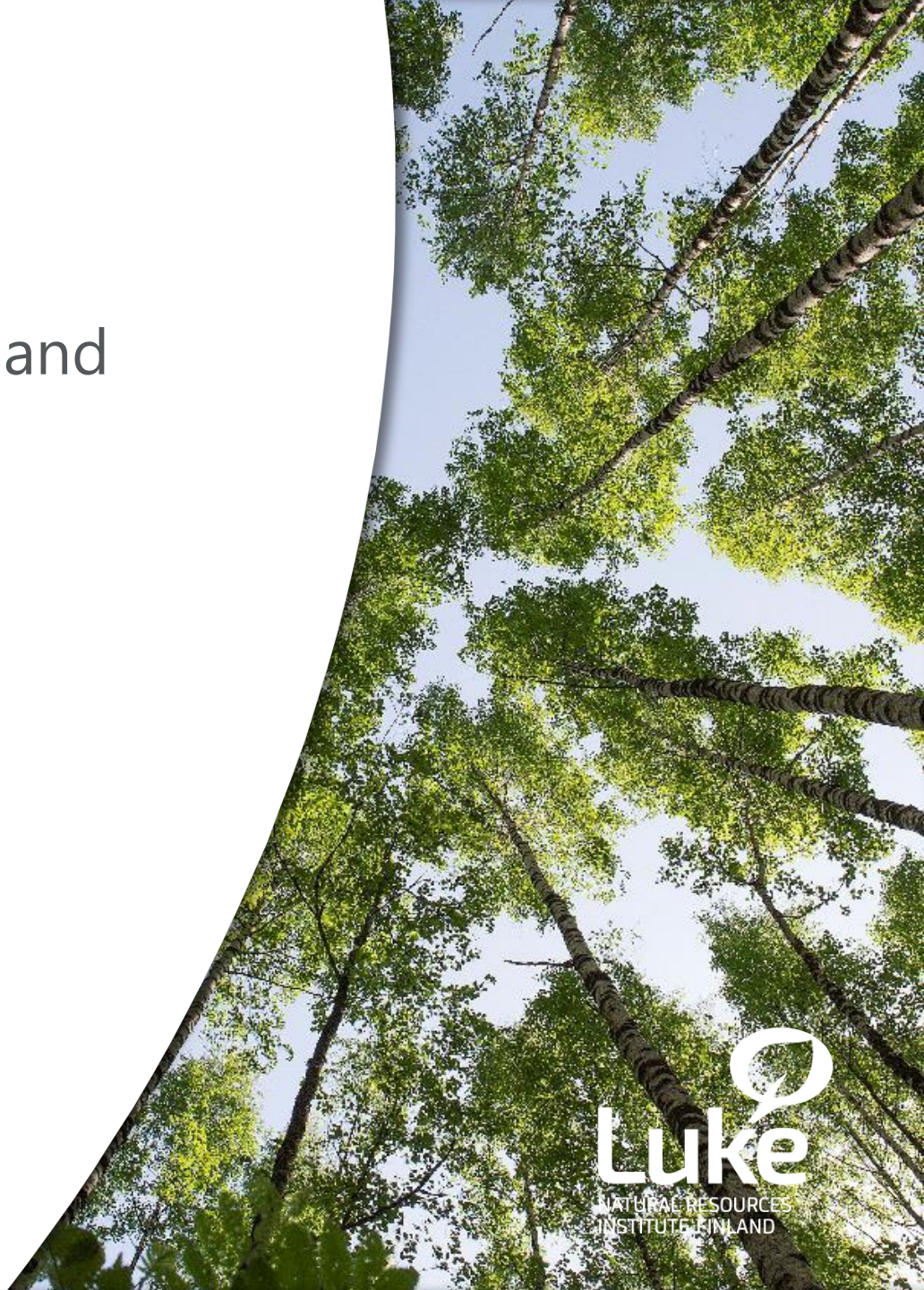
Many terms meaning (partly) the same thing and aiming for the same goal?



Ambiguity of terms

Many terms meaning (partly) the same thing and aiming for the same goal?

- Continuous cover forestry
- Closer to nature forestry
- Integrative forest management



Ambiguity of terms

Many terms meaning (partly) the same thing and aiming for the same goal?

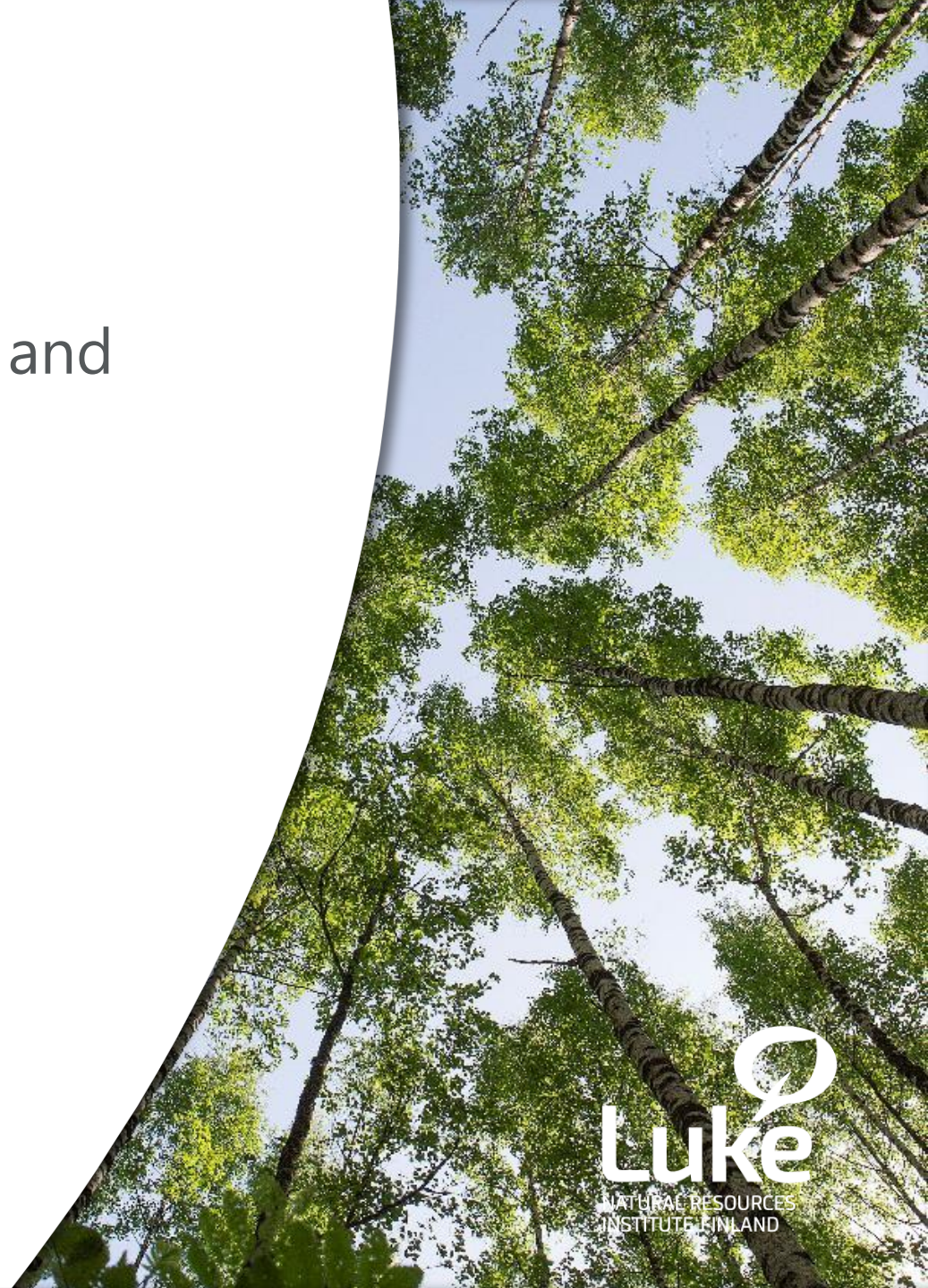
- Continuous cover forestry
- Closer to nature forestry
- Integrative forest management:

> *" Integrative forest management (IFM) aims at integrating biodiversity conservation and global change adaptation into forest management for the sustainable provision of multiple ecosystem services."* TRANSFORMIT -project (https://transformforests.eu/about/)

Ambiguity of terms

Many terms meaning (partly) the same thing and aiming for the same goal?

- Continuous cover forestry
- Closer to nature forestry
- Integrative forest management
- Regenerative forest management



Ambiguity of terms

Many terms meaning (partly) the same thing and aiming for the same goal?

- Continuous cover forestry
- Closer to nature forestry
- Integrative forest management
- Regenerative forest management:

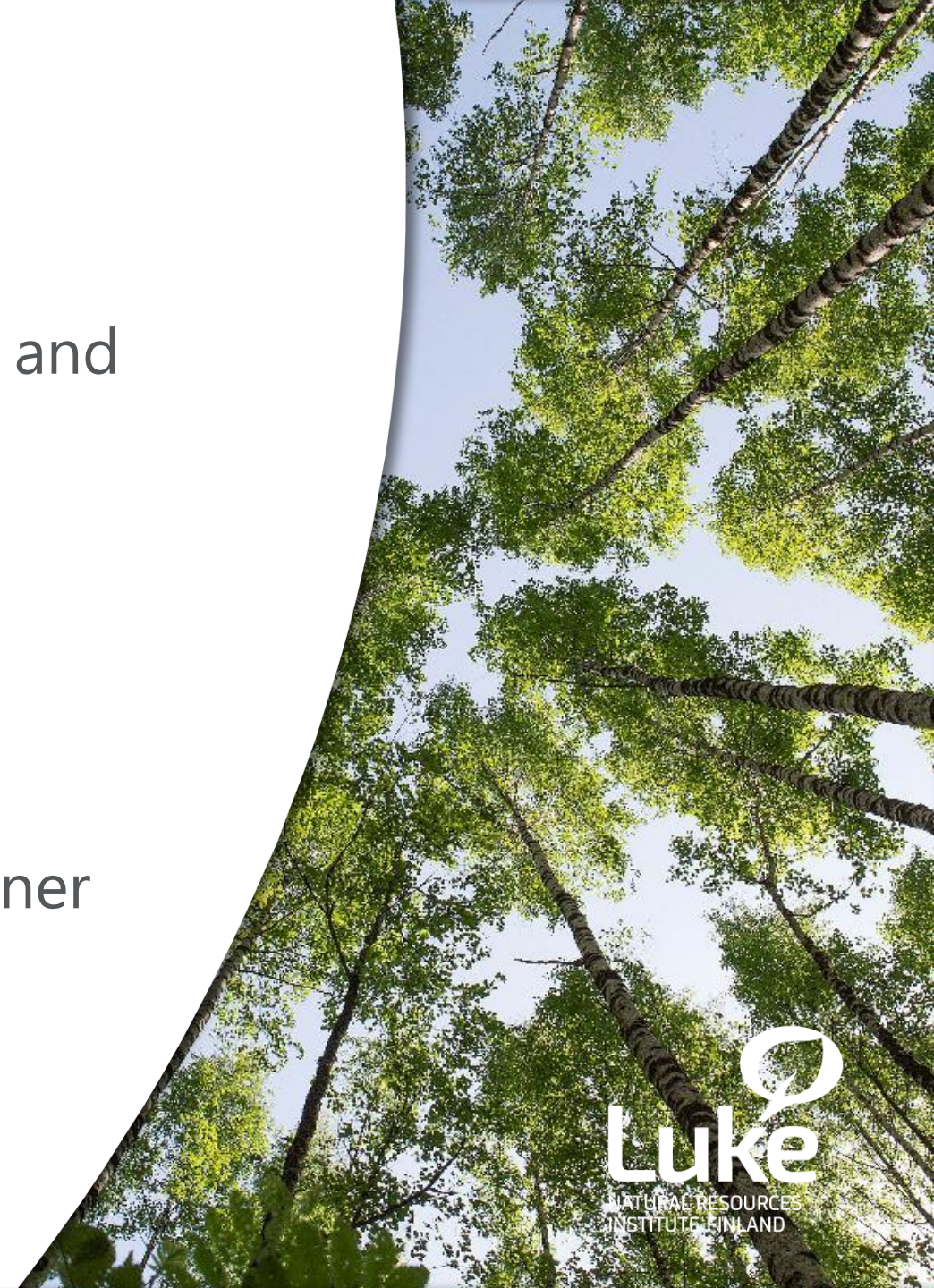
"In regenerative forestry, the aim is to increase the diversity of forests through various practical measures. In addition to a more diverse nature, the measures are financially profitable for the forest owner." MetsäGroup

Ambiguity of terms

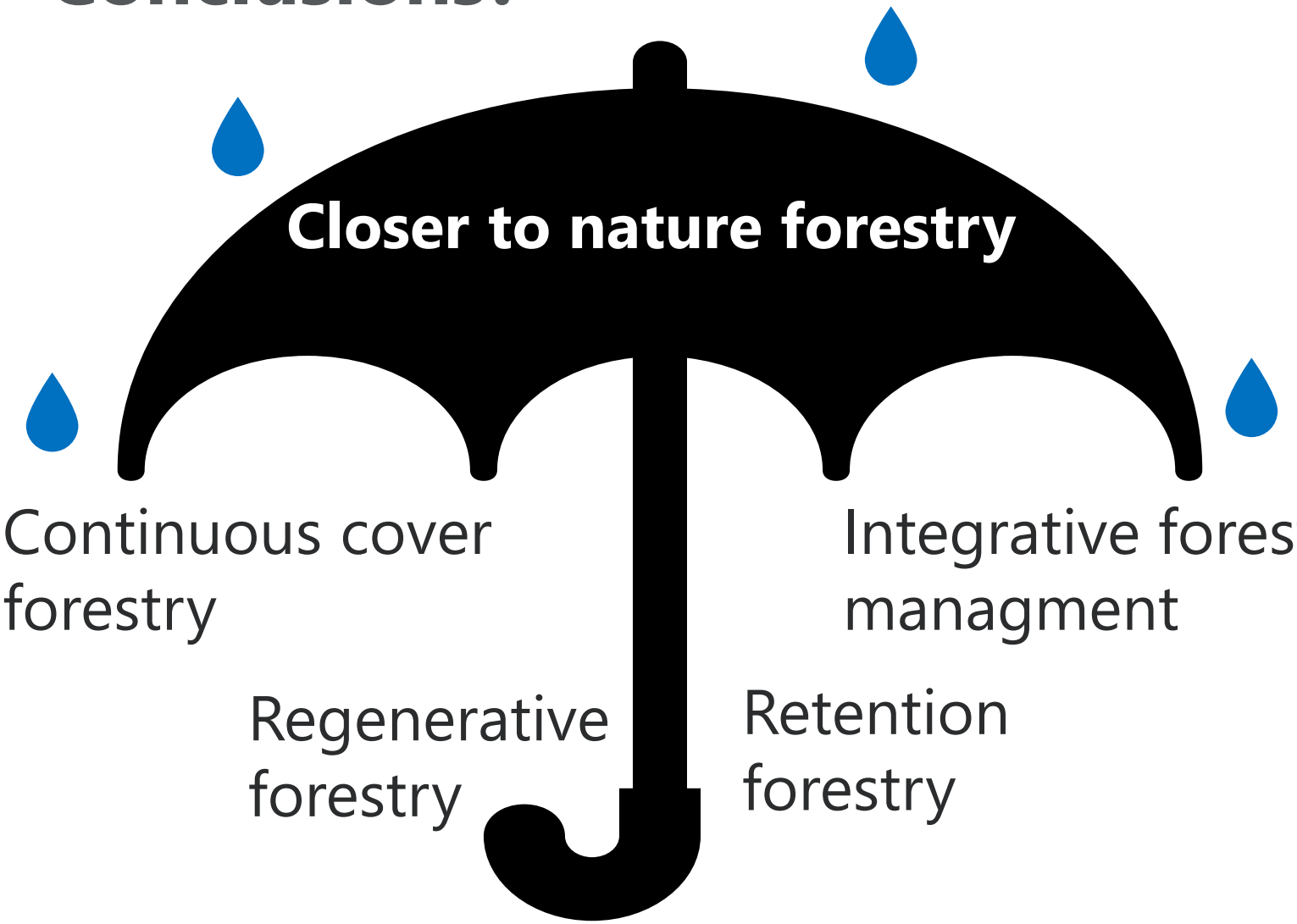
Many terms meaning (partly) the same thing and aiming for the same goal?

- Continuous cover forestry
- Closer to nature forestry
- Integrative forest management
- Regenerative forest management

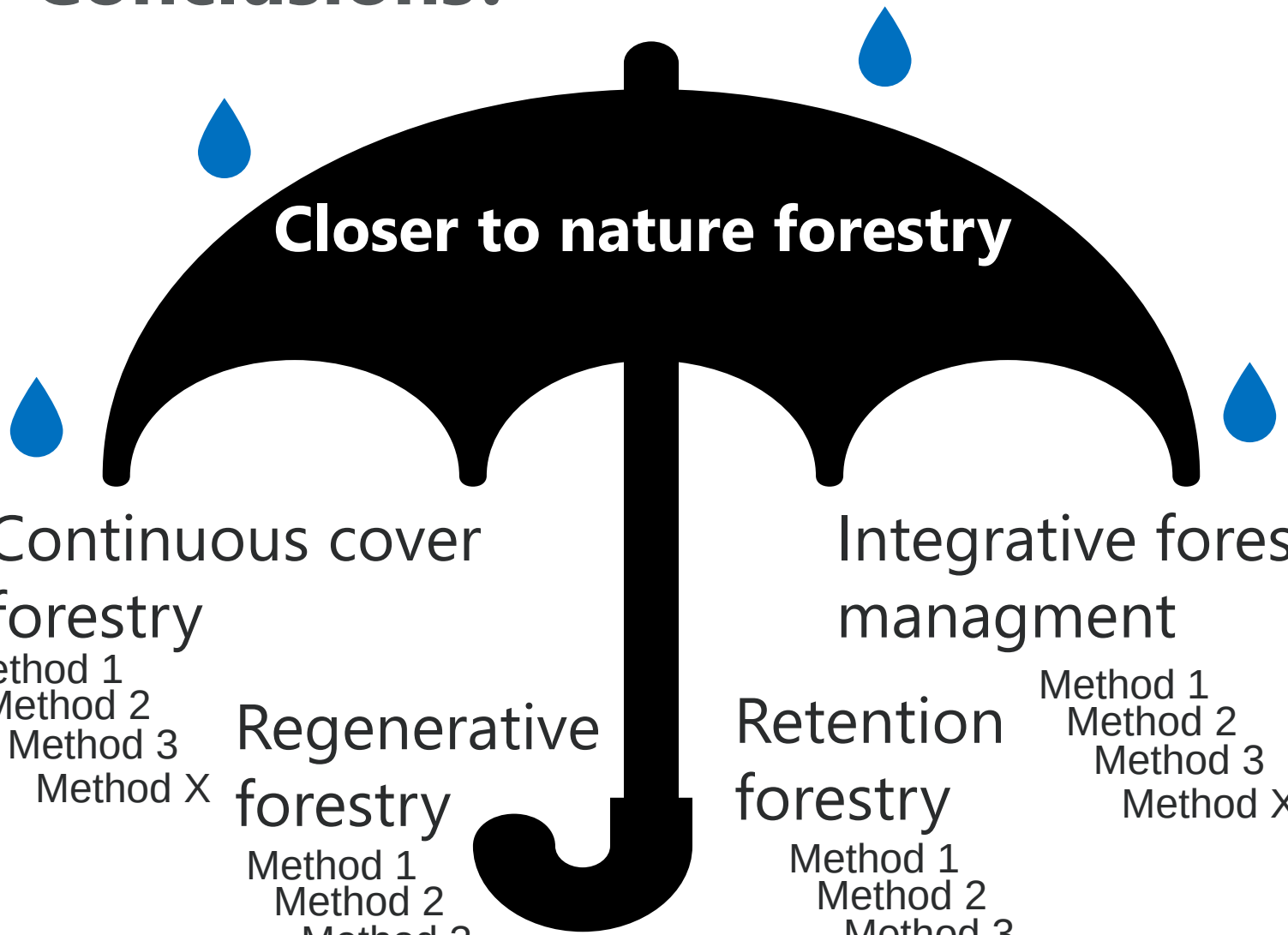
But none of these is a method that forest owner could apply in his/her forest



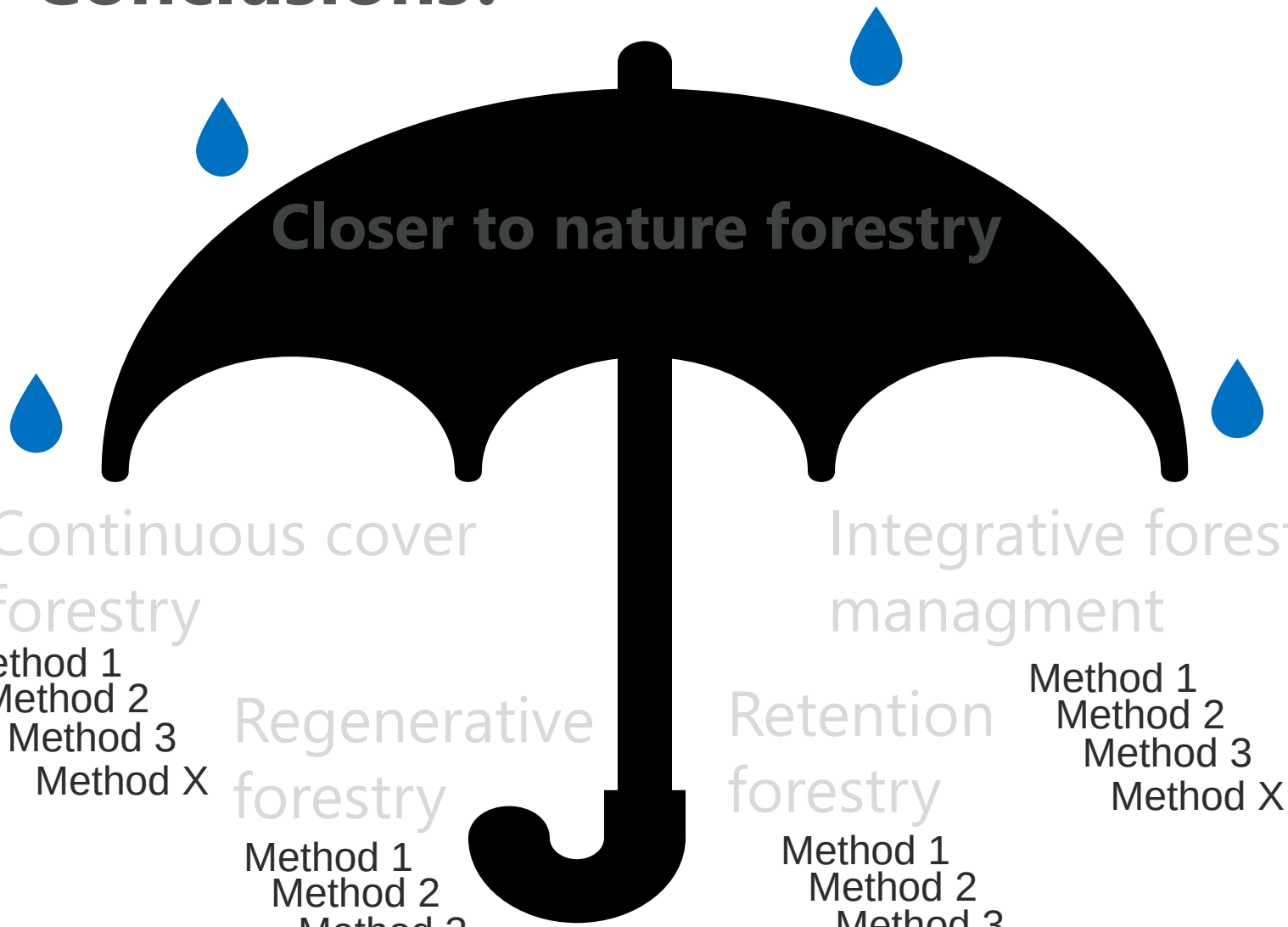
Conclusions?



Conclusions?



Conclusions?



Thank you for your attention!

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Content of the book

https://link.springer.com/book/10.1007/978-3-031-70484-0