

Identifying European old-growth forests based on field data: The old-growth indicator.

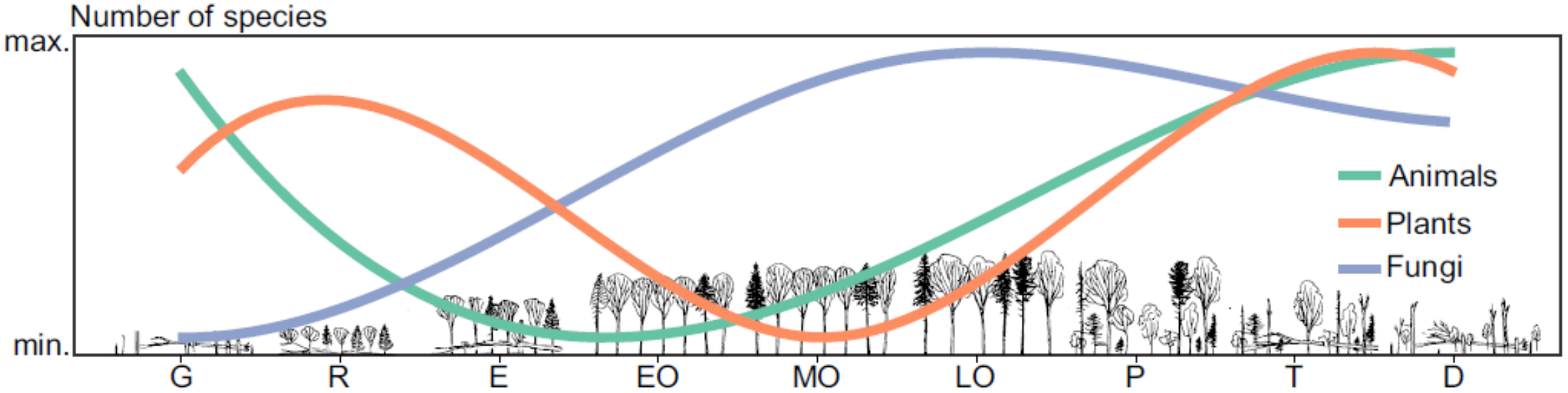
Dr. Peter Meyer (NW-FVA, Germany)

Overview

- Forest dynamics and old-growthness
- Shifting baseline
- Unique character of Old-Growth Forests
- Old-Growth attributes
- The Old-Growth Indicator
- Preliminary Results
- Concluding remarks

Forest dynamics and old-growthness

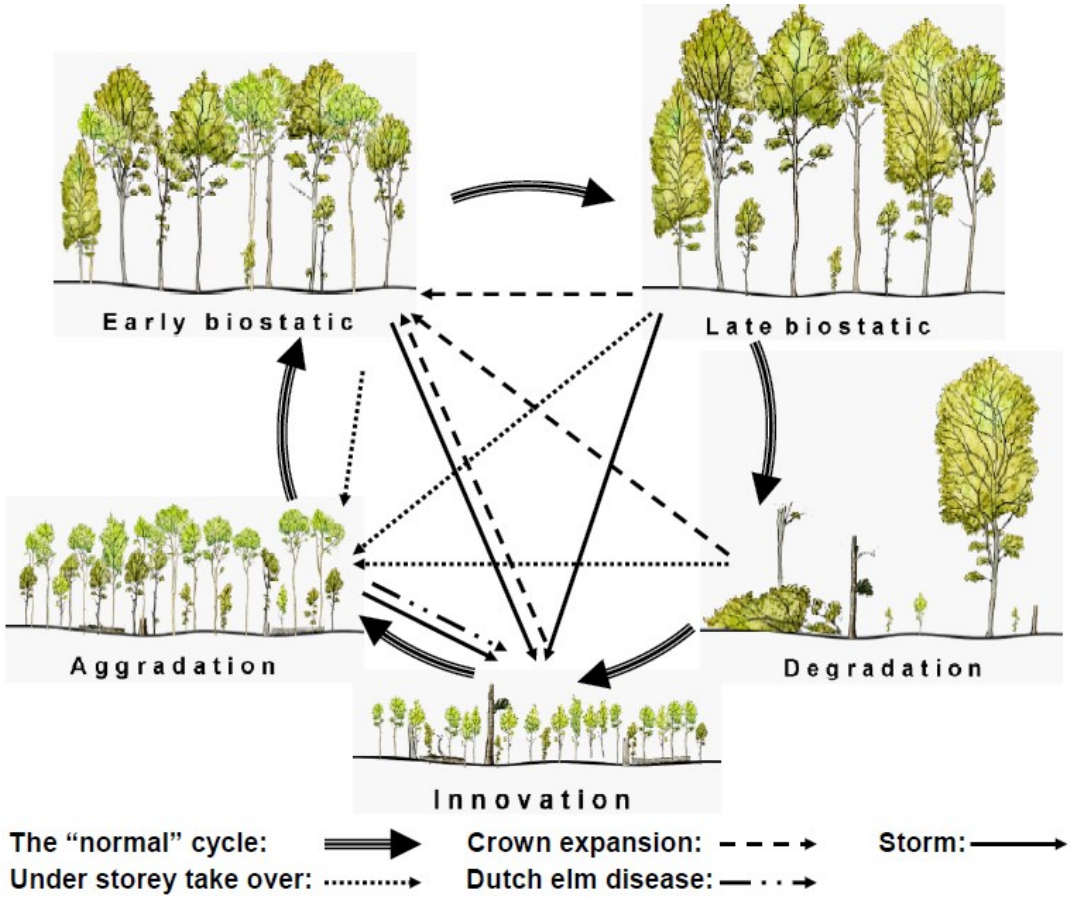
Development phases and species richness



aus: Hilmers et al. (2018), Journal of Applied Ecology, 55, 2756-2766

Forest dynamics and old-growthness

Multivariable, non-linear dynamics in reality

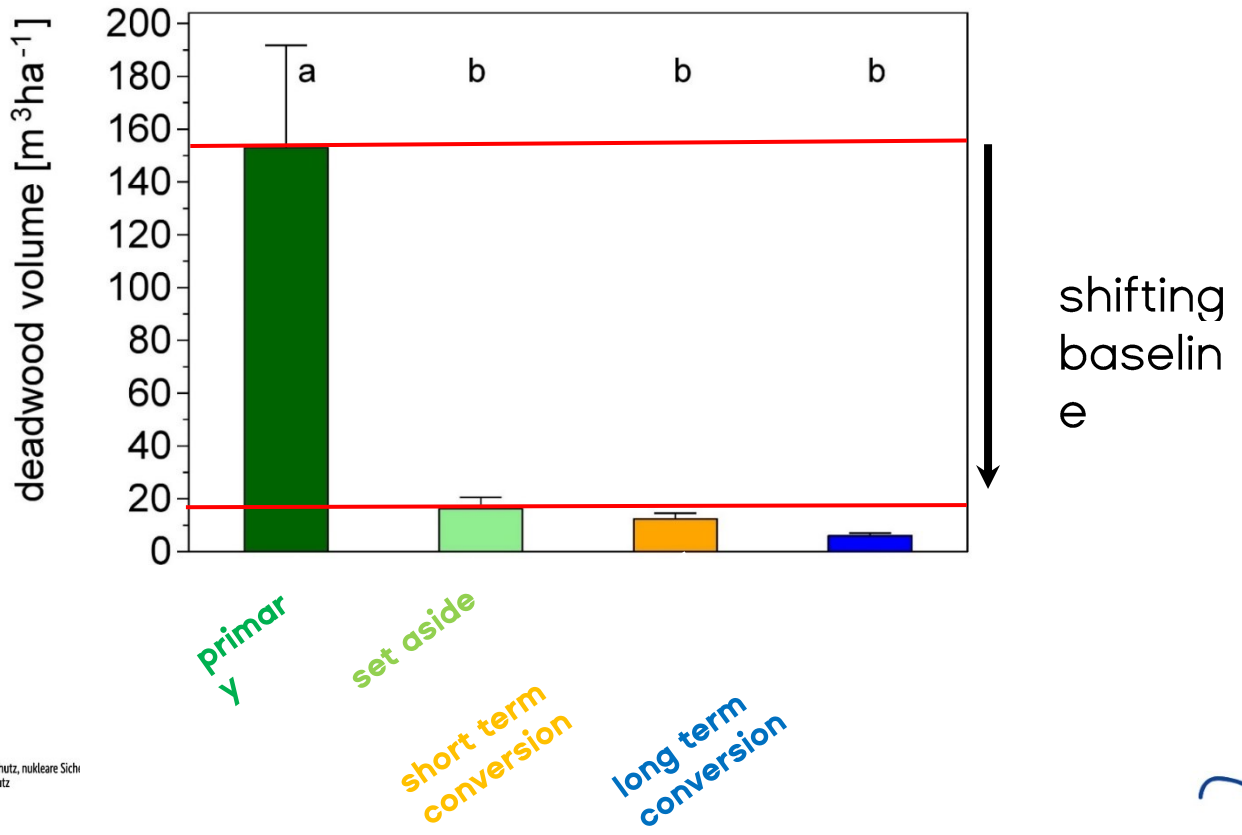




taken from: Larsen et al. (2010), Forstarchiv, 81, 21-33

Shifting baseline

Comparison of deadwood amount

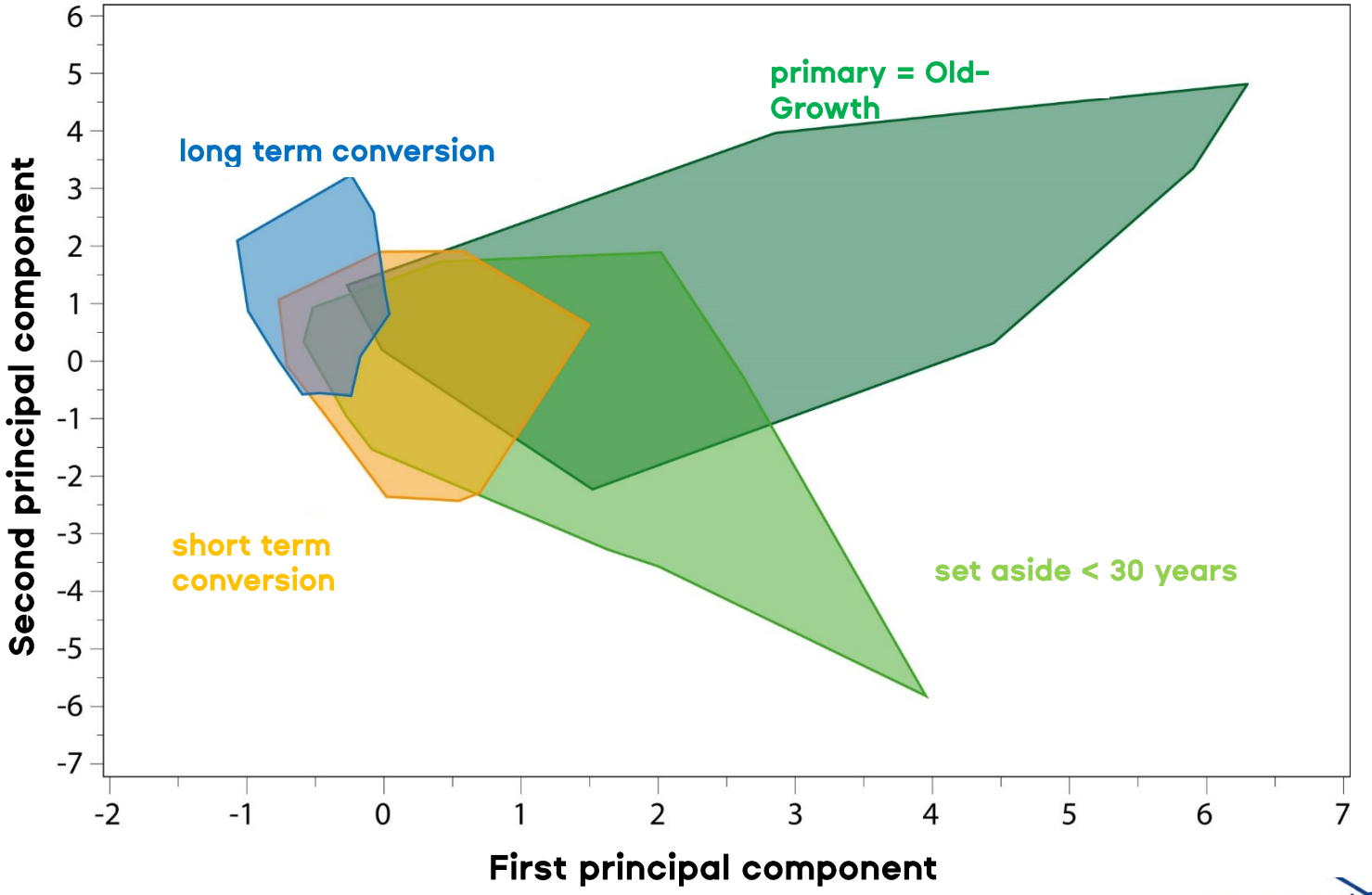


adapted from: Schneider et al. (2023), Natur und Landschaft, 98 (2), 49-57, DOI: 10.19217/NuL2023-02-01

Gefördert durch:
Bundesministerium für Ernährung und Landwirtschaft
aufgrund eines Beschlusses des Deutschen Bundestages

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Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz
aufgrund eines Beschlusses des Deutschen Bundestages

Unique character of Old-Growth Forests



adapted from Schneider et al. (2023), Natur und Landschaft, 98 (2), 49-57, DOI: 10.19217/NuL2023-02-01

Old-Growth attributes

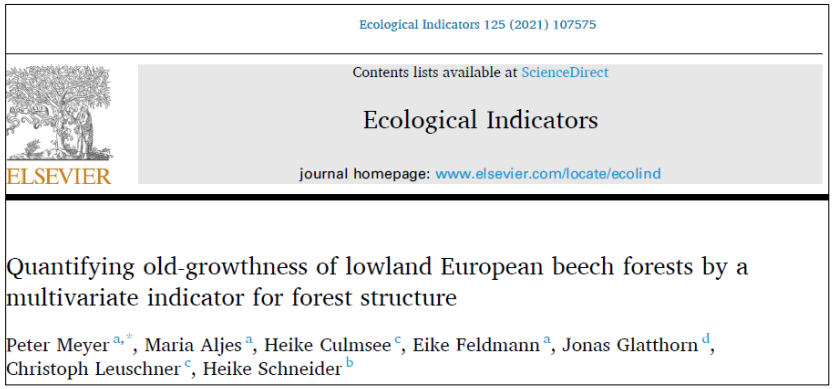
General characteristic:

- continuous, not categorial
- multivariate
- dynamic (disturbances may change the level of old-growthness)

(see: Wirth et al. 2009, Bauhus et al. 2009, Bergeron & Harper 2009, Meyer et al. 2021, Vandekerkhove et al. 2022)

specific attributes of old-growthness
native, shade-tolerant tree species dominant
high stand density (basal area, volume, biomass)
high number and volume of snags
amount of coarse woody debris high
wide range of decay stages of deadwood
multiple canopy layers and highly variable tree sizes
many giant trees
abundant advanced tree regeneration in different development stages
heterogeneous spatial tree distribution
many tree related microhabitats (cavities, fruiting bodies of perennial fungi, ...)
thick humus layer
irregular spatial distribution of different sizes of canopy gaps

The Old-Growth Indicator (OGI)



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Quantifying old-growthness of lowland European beech forests by a multivariate indicator for forest structure

Peter Meyer [a,*], Maria Aljes [a], Heike Culmsee [c], Eike Feldmann [a], Jonas Glatthorn [d], Christoph Leuschner [c], Heike Schneider [b]

18 variables (in Life Prognoses) arranged to 9 thematic groups

- deadwood
- decay stage
- development stages
- microhabitats
- native species
- stand density
- successional status
- tree dimensions
- tree species richness

single as well as aggregated OGI-values can be calculated: allows for summarized and differentiated interpretation

The Old-Growth Indicator (OGI)

90 % range of old-growth stands (OG range)



90 % range of comparison stand

overlap | excess

Combining overlap and excess to final OGI

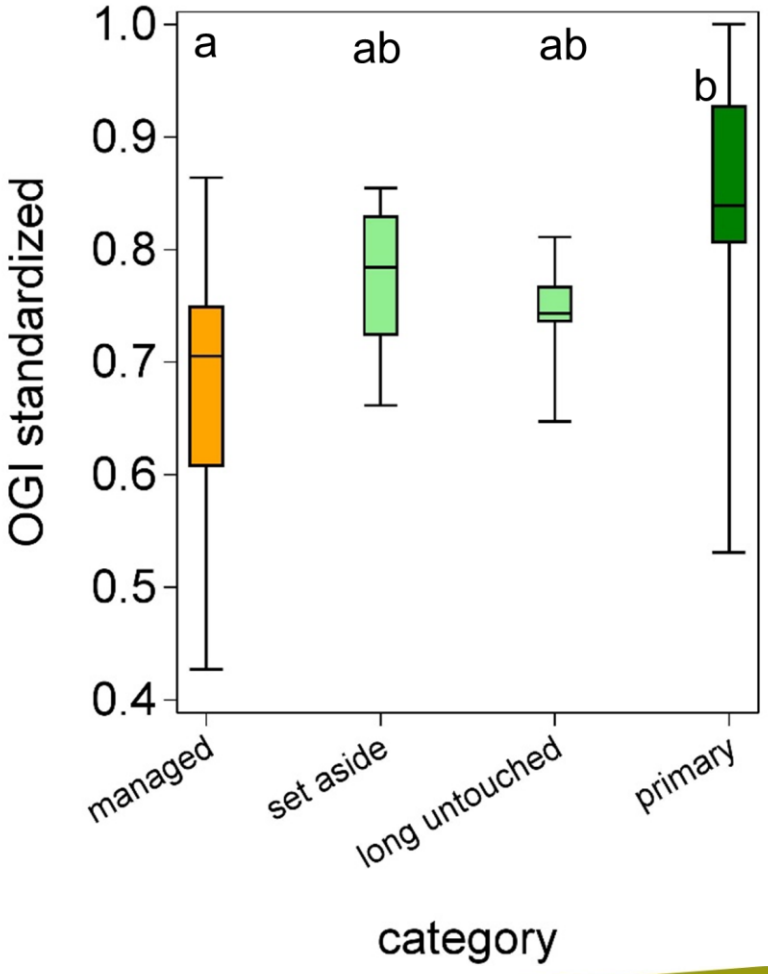
$$OGI = \frac{OGI_{com} + OGI_{exc}}{2}$$

$$OGI_{com} = \frac{overlap}{OG\ range} \qquad OGI_{exc} = 1 - \frac{excess}{comparison\ range}$$

Preliminary results OGI

Significant difference between managed and primary forests (multi comparison test)

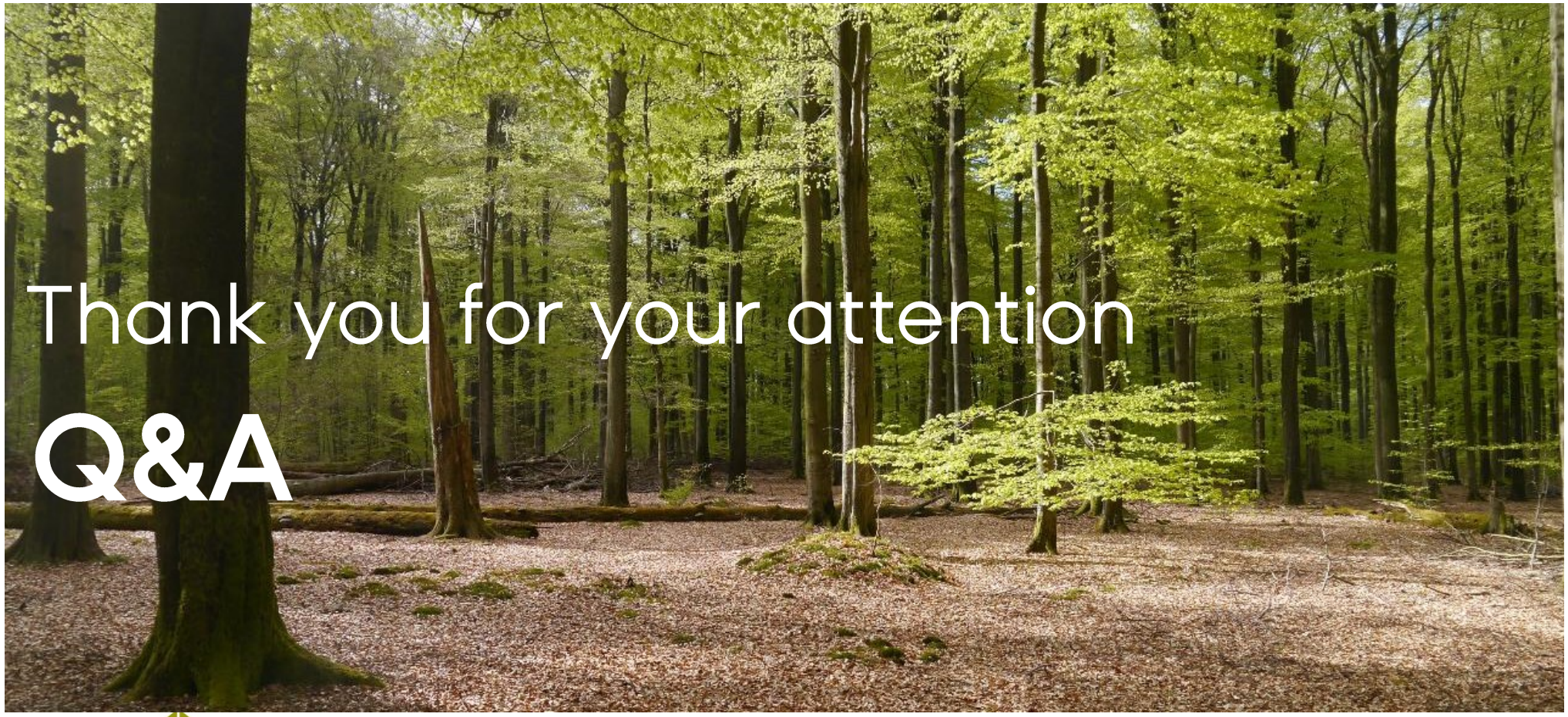
Intermediate position of set aside and long untouched stands



Concluding remarks



- Database of reference stands extended significantly
- Regular forest inventory data suitable to calculate OGI
- Some adaptations and restrictions need discussion (plot size, number of plots, stand definition and delineation)
- Rather high overall level of old-growthness; possible reasons:
  - strata-wise calculation (vs. spatially explicit)
  - comparison stands: bias towards near natural stands; close to nature management



Thank you for your attention

Q&A