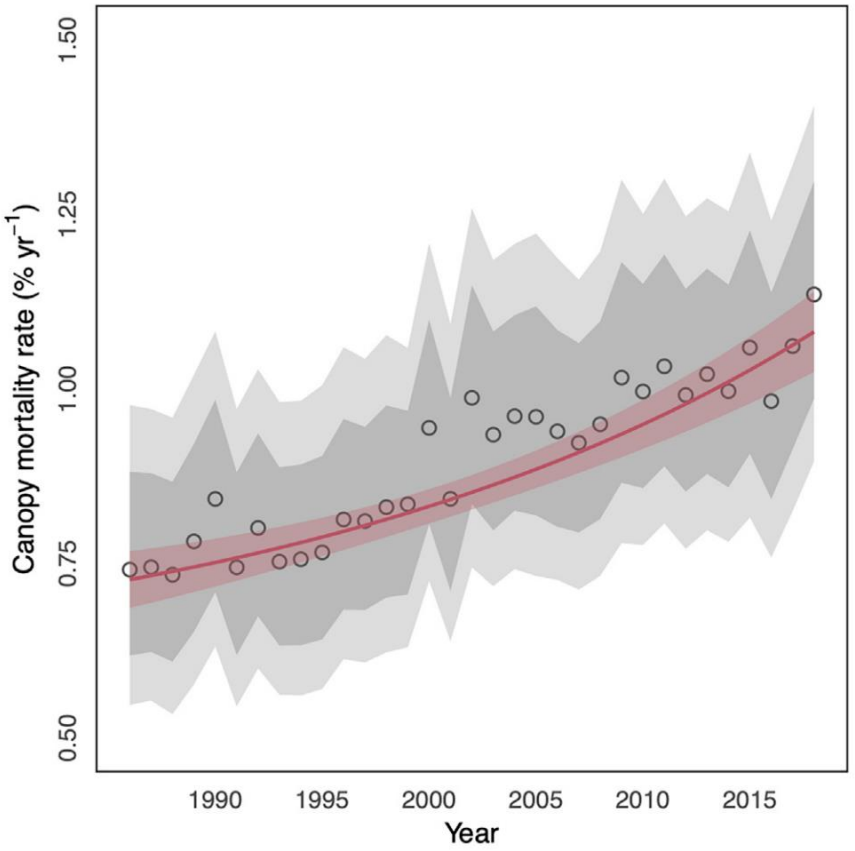
Enhancement of Biodiversity in Forest Ecosystems

Bart MUYS, KU Leuven

ICA Annual Conference, 20 October 2022, Kaunas, Lithuania

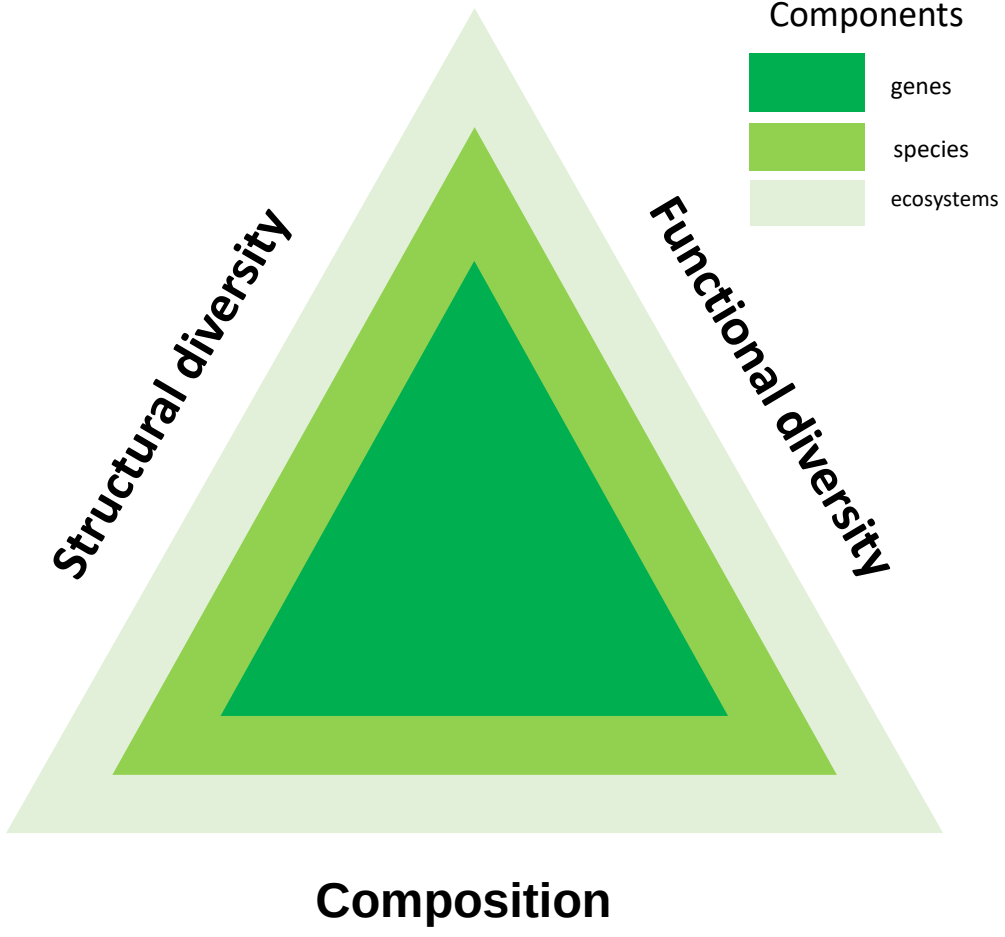


Context

Alarming increase in forest canopy mortality levels in Europe

Senf et al. 2021. O*ne Earth*

Elements of forest biodiversity



Muys et al. 2022, EFI S2P 13

Monitoring forest biodiversity

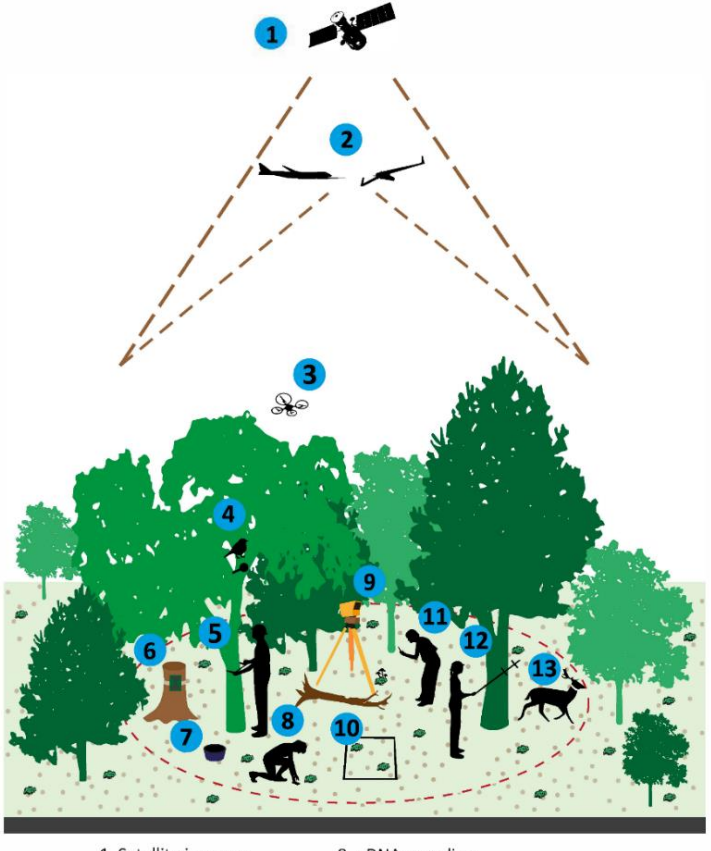
Habitat Directive: diversity loss in threatened species and threatened forest habitats

NFIs: overall diversity gain in average forests

= not a contradiction

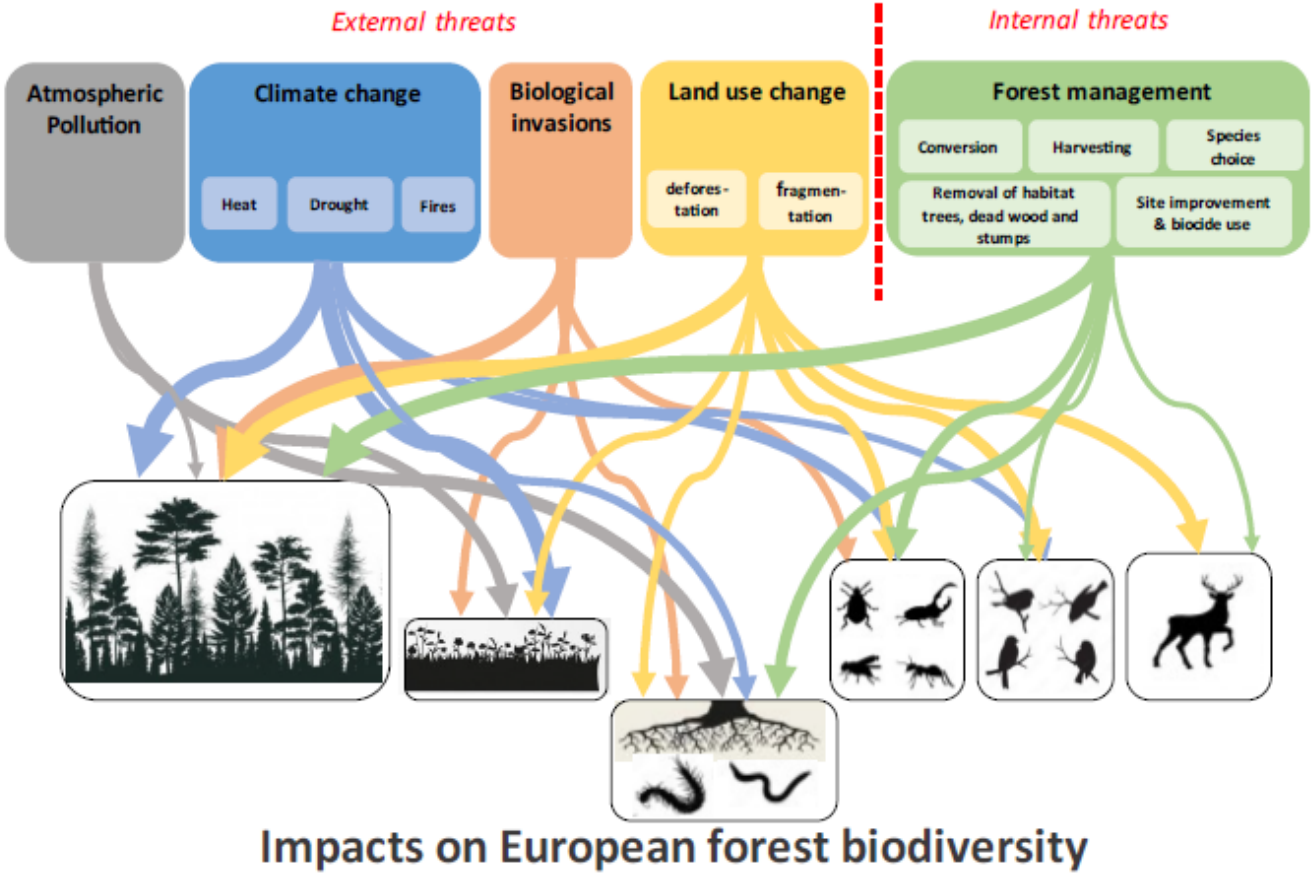
Future:

- Boost NFIs with additional indicators
- Further develop high-tech + citizen science



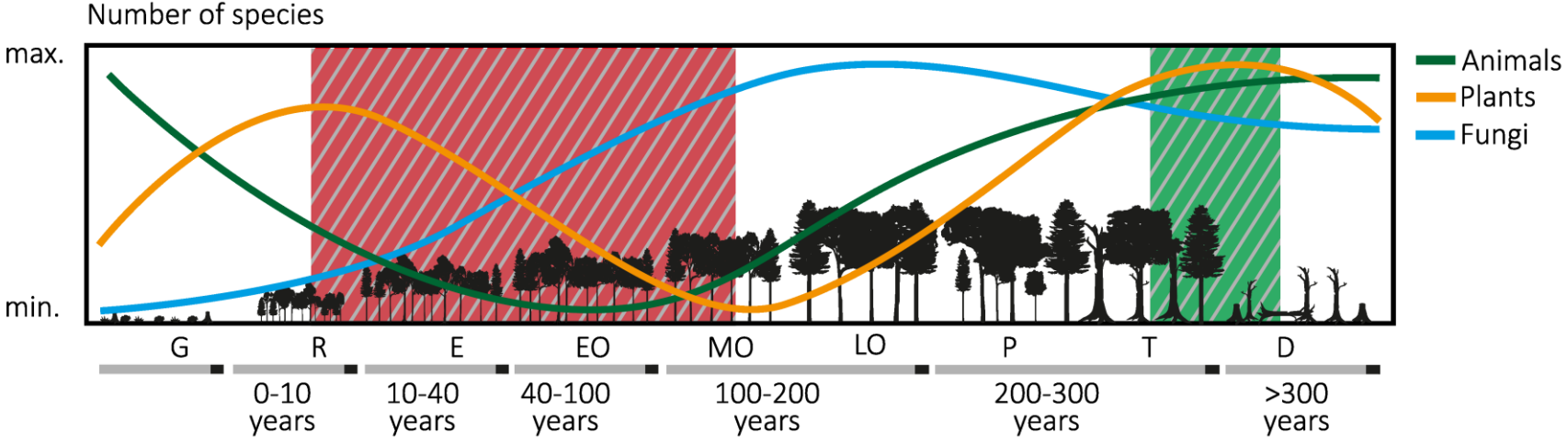
Muys et al. 2022, EFI S2P 13

Threats to European forest biodiversity



Muys et al. 2022, EFI S2P 13

Potential mismatch between forest management and biodiversity



G = gap; R = regeneration; E = establishment; EO = early optimum; MO = mid-optimum; LO = late optimum; P = plenter; T = terminal; D = decay (after *Hilmers et al. 2018*).

Muys et al. 2022, EFI S2P 13

Forestry is less intensive than agriculture, but even close-to-nature forests may lack development phases

Biodiversity enhancing management for FMUs

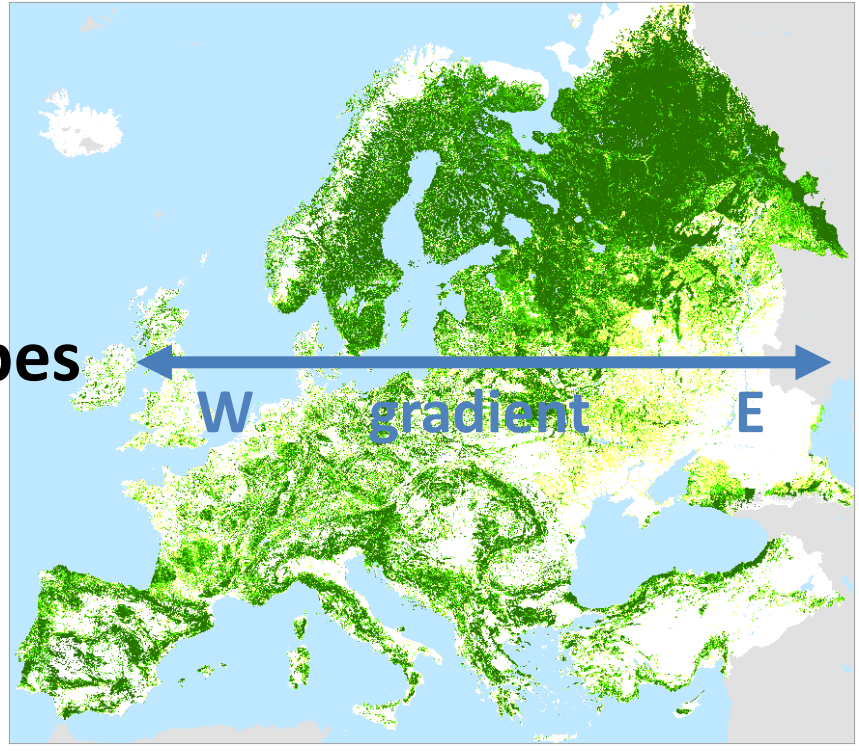
Biodiversity as a heritage

conservation based on management legacies

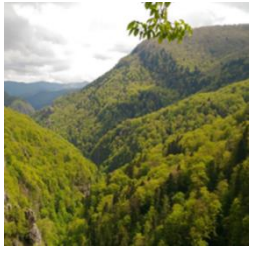
Ancient forests

Cultural landscapes

Non-forest landscapes with trees (maquis, dehesa, heathland)



Primary forests

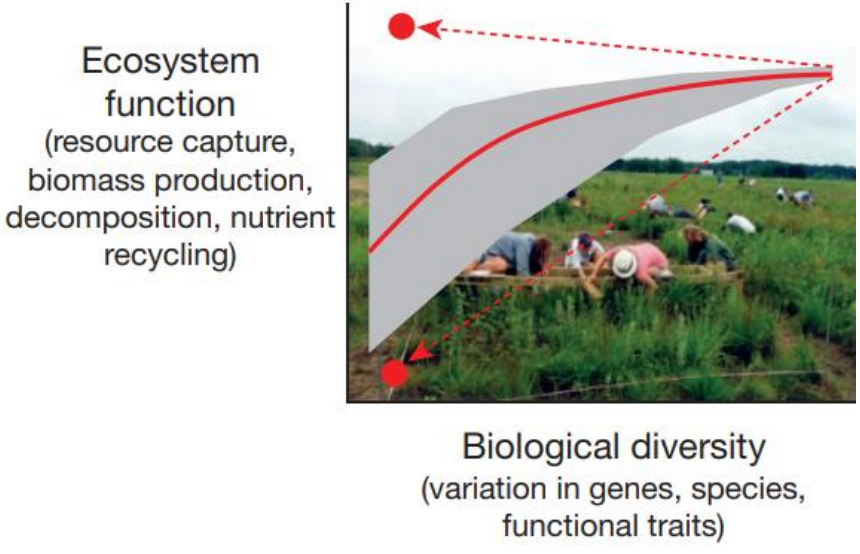


Naturalness

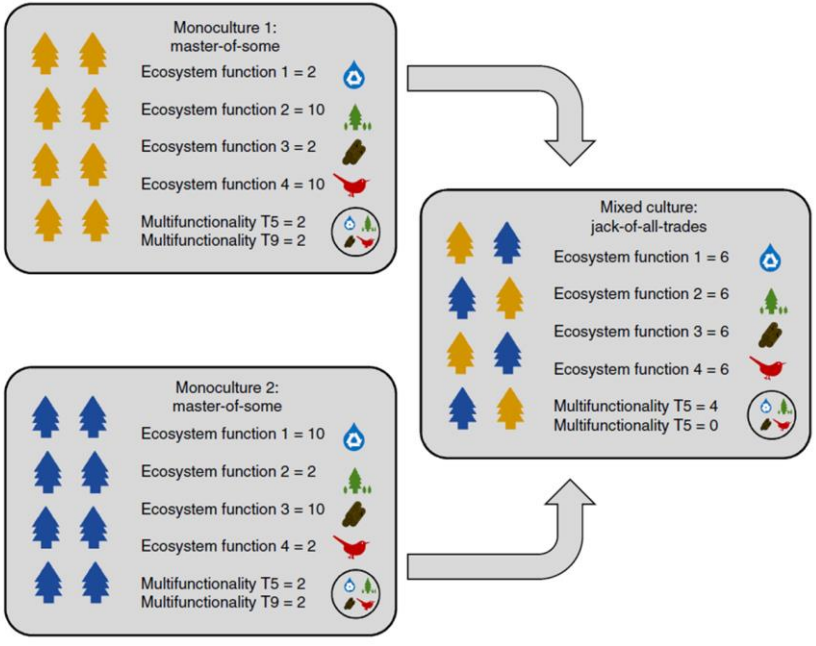
Old growth forests

Van Meerbeek et al. 2019 Bioscience

Biodiversity as an asset



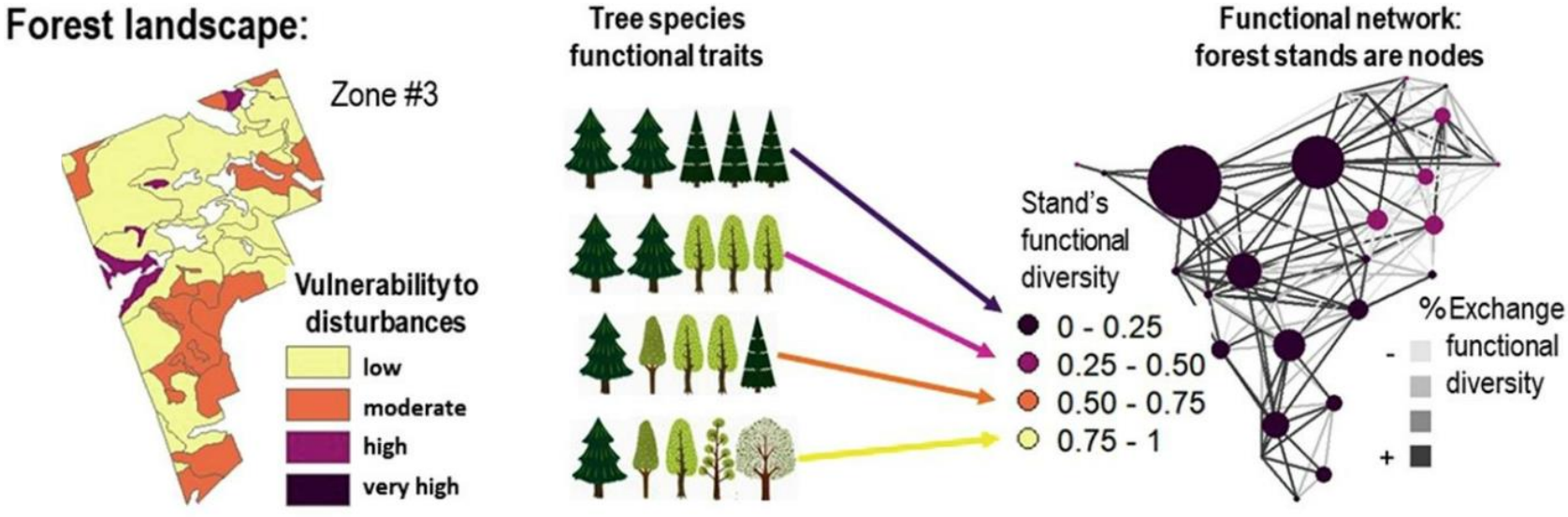
Cardinale et al. 2012, Nature



van der Plas et al. 2016, Nature Communications

Recent research outcomes on effect of biodiversity on productivity, stability and multifunctionality motivate increasing mixture, also in climate smart plantation forestry

Restoring complex functional networks of tree species



Aquilué et al. 2021. Fo*rest Ecology & Management*

Biodiversity to be fostered in any FMU


Tree species mixture


Connectivity


Disturbances

Genetic resources

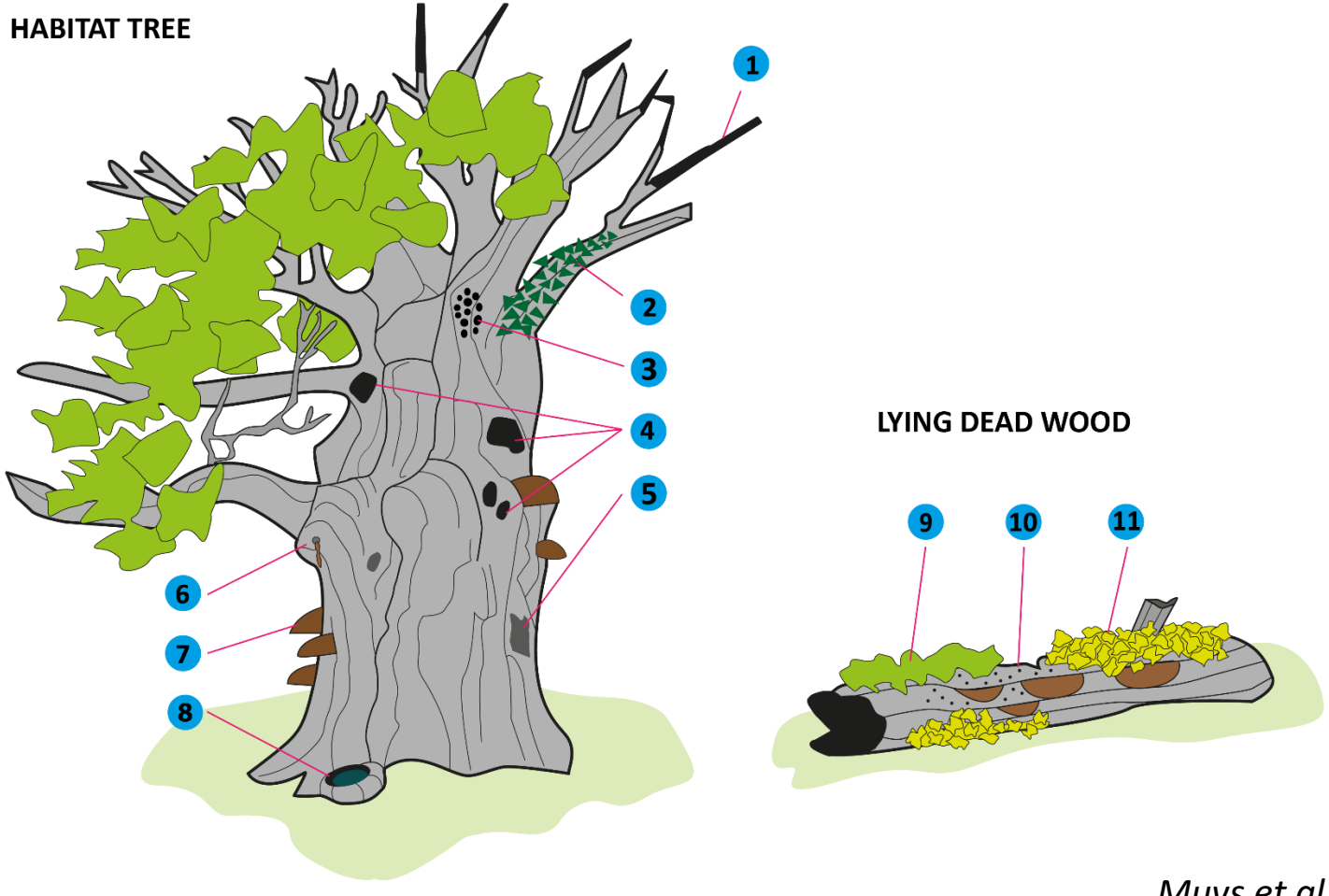
Habitat trees


Deadwood

Microhabitats


Rare biotopes

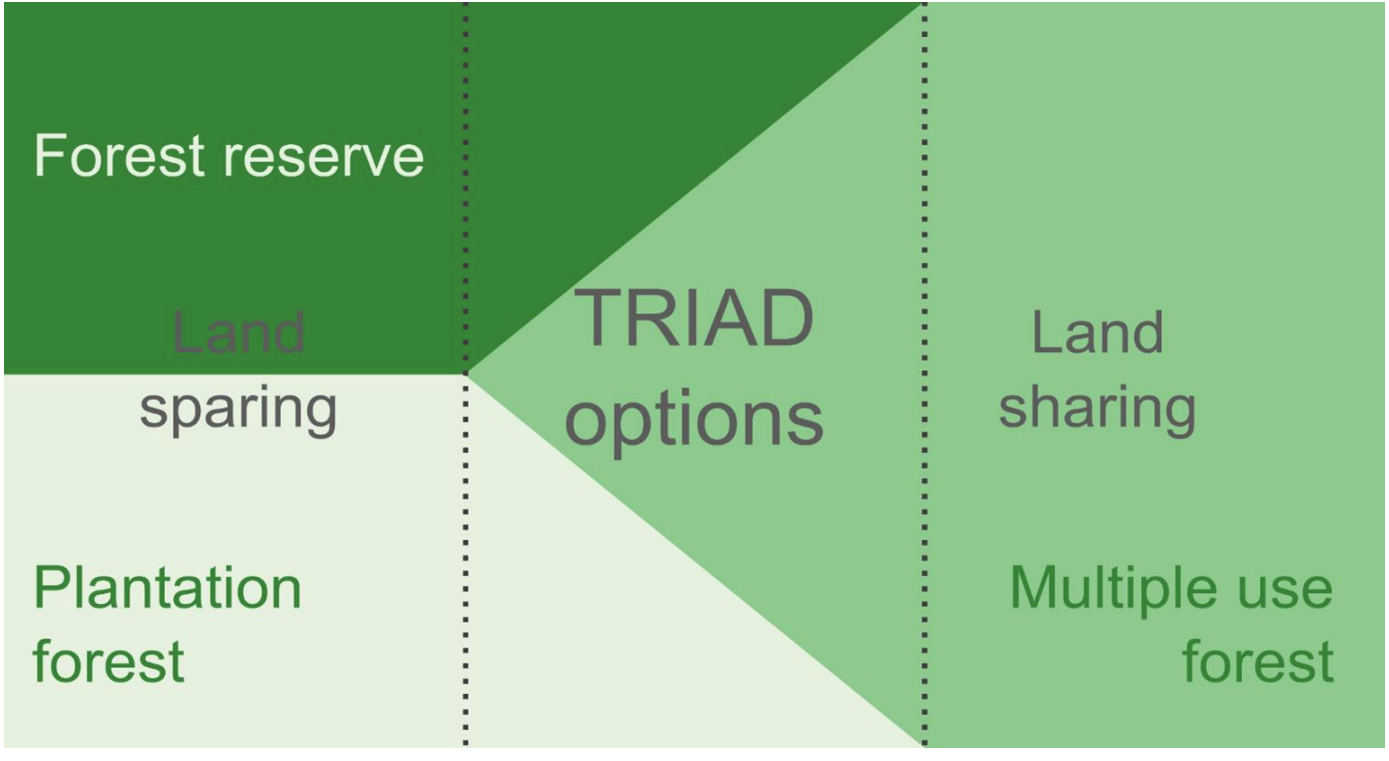
Microhabitats



1. Crown deadwood
2. Lichens and mosses
3. Woodpecker holes
4. Cavities and rot holes
5. Tree injuries and exposed wood
6. Exudates
7. Fruiting bodies of saproxylic fungi and slime moulds
8. Waterpool called dendrotelm
9. Seed bed for new tree seedlings
10. Boreholes of insects
11. Lichens and mosses

Muys et al. 2022, EFI S2P 13

Forest management at regional scale

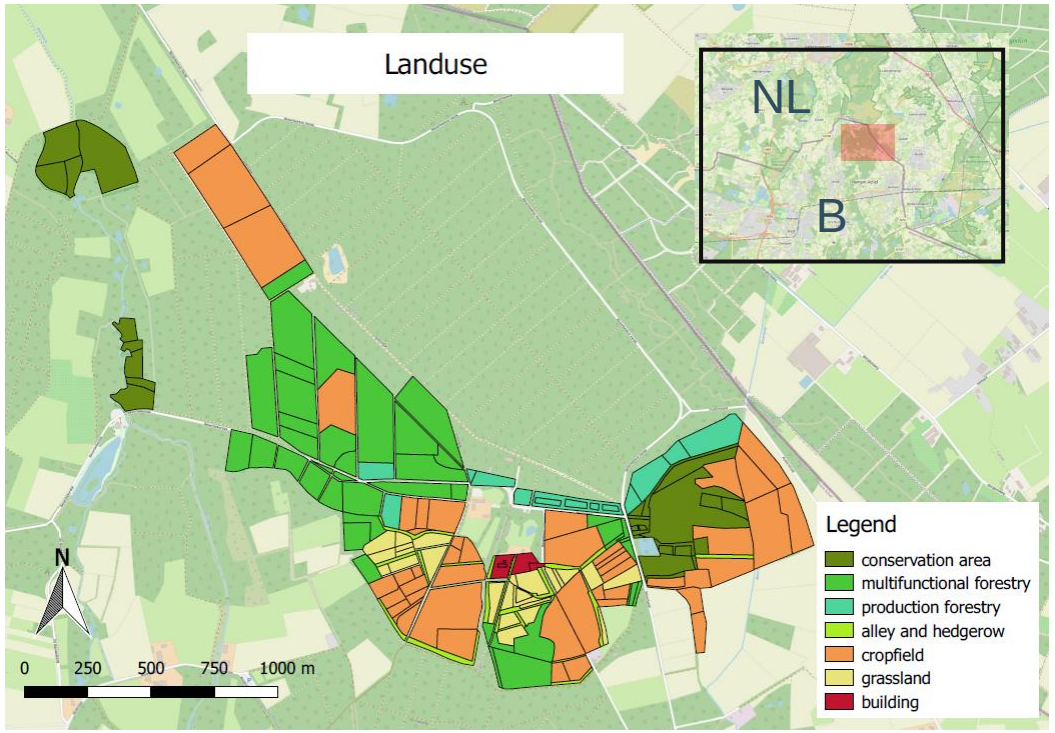


Triad example: 20% unmanaged, 70% multiple use, 10% intensively managed

Muys et al. 2022, EFI S2P 13

Controversial: Triad management may motivate decrease of multifunctional forest at the expense of more conservation area and more plantation forestry

TRIAD in practice: KU Leuven university domain Beverbeek



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Take home messages

1. Recuperating forest stability is a top priority
2. Mixture is a key asset to forest resilience
3. Replacing an industry-following nature by a nature-following industry is a key step in the transition to the circular bioeconomy
4. Landscape optimization between conservation, production and other ES is feasible with a TRIAD approach considering legacies
5. ICA members have a huge responsibility for ensuring biodiversity literacy in society. They should operate as an example and innovation niche for global biodiversity enhancement

Forest Biodiversity in Europe

Content

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Thank you for your attention

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