

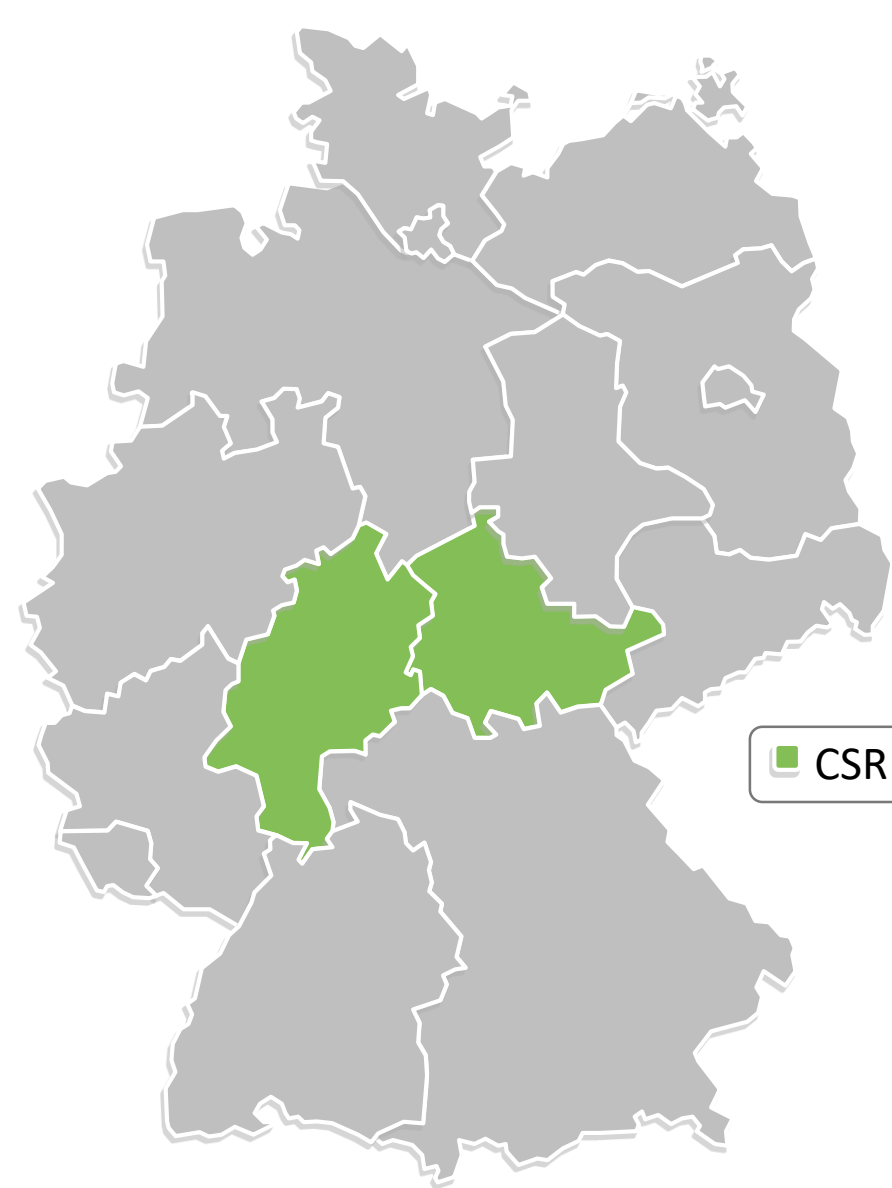
# WP4: Silviculture and Management of Continental Forests

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Aim: "Promoting silvicultural management strategies that result in stable and resilient forests to best provide multiple FES."

## Case Study Region (CSR)



- The CSR comprises the federal states Hesse and Thuringia (Germany).
- Size of CSR: 37,287 km<sup>2</sup>
- Forest area share: 38.7 %
- Dominating tree species are European beech, Norway spruce, Scots pine and oak species.
- Vertical structure: 61 % double-layered, 31 % single-layered, 9 % multi-layered.
- Stand mixture: 53 % mixture of conifers and deciduous, 27 % only deciduous, 20 % only conifers.

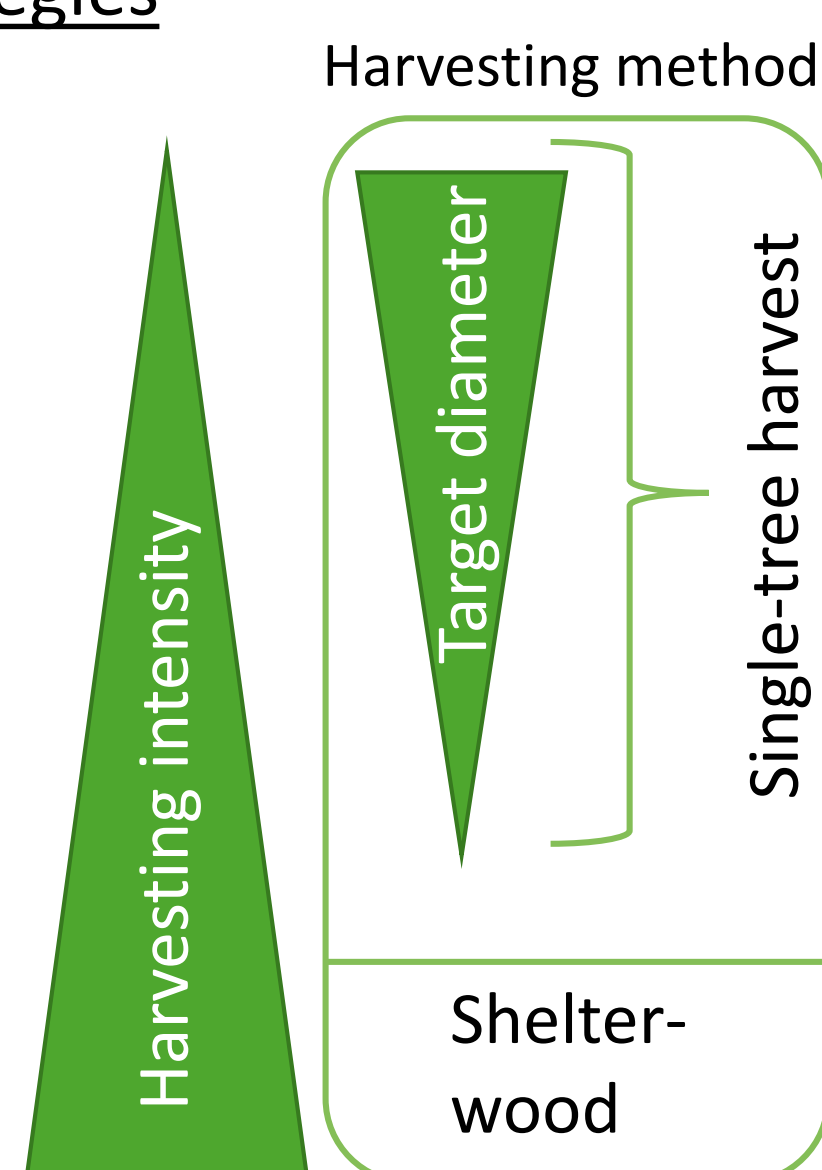
## Methodology

### Representative forest stands

- CSR is represented by 24 typical forest types.
- Differentiated by:
  - Main tree species (beech, oak, spruce, pine)
  - Mixture (pure, mixed)
  - Age (young, medium, old aged)
- Data basis is the 3<sup>rd</sup> National Forest Inventory of Germany.

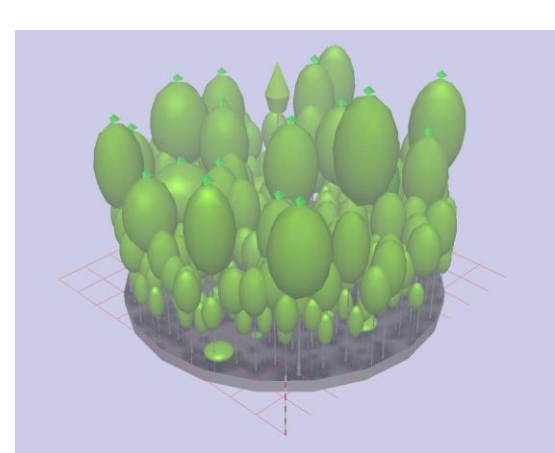
### Management strategies

- (A) Extensified management
- (B) BAU
- (C) Climate-adapted management
- (D) Intensified management

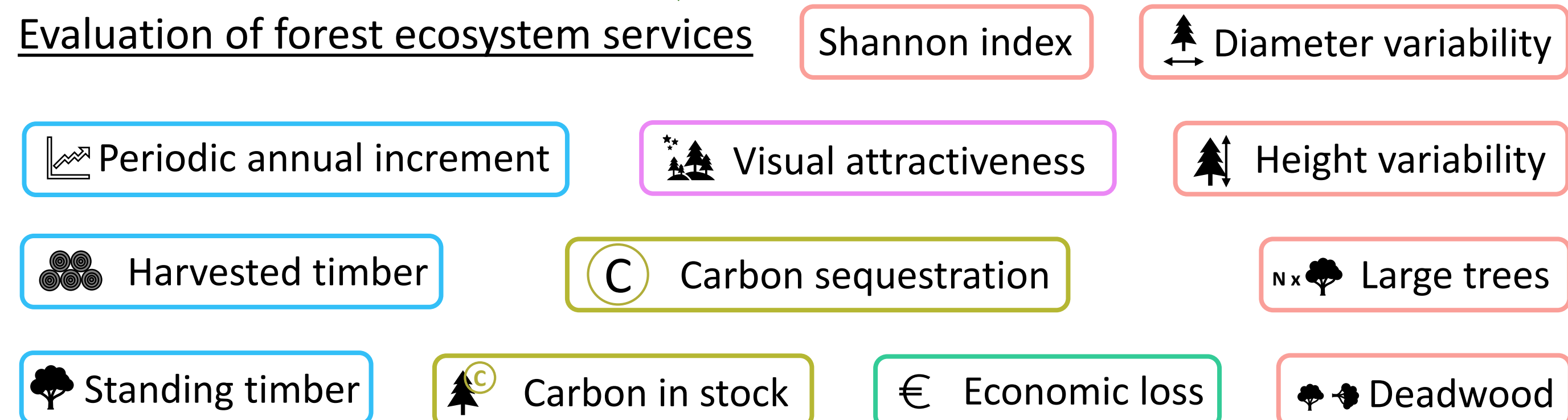


### Growth and yield simulation

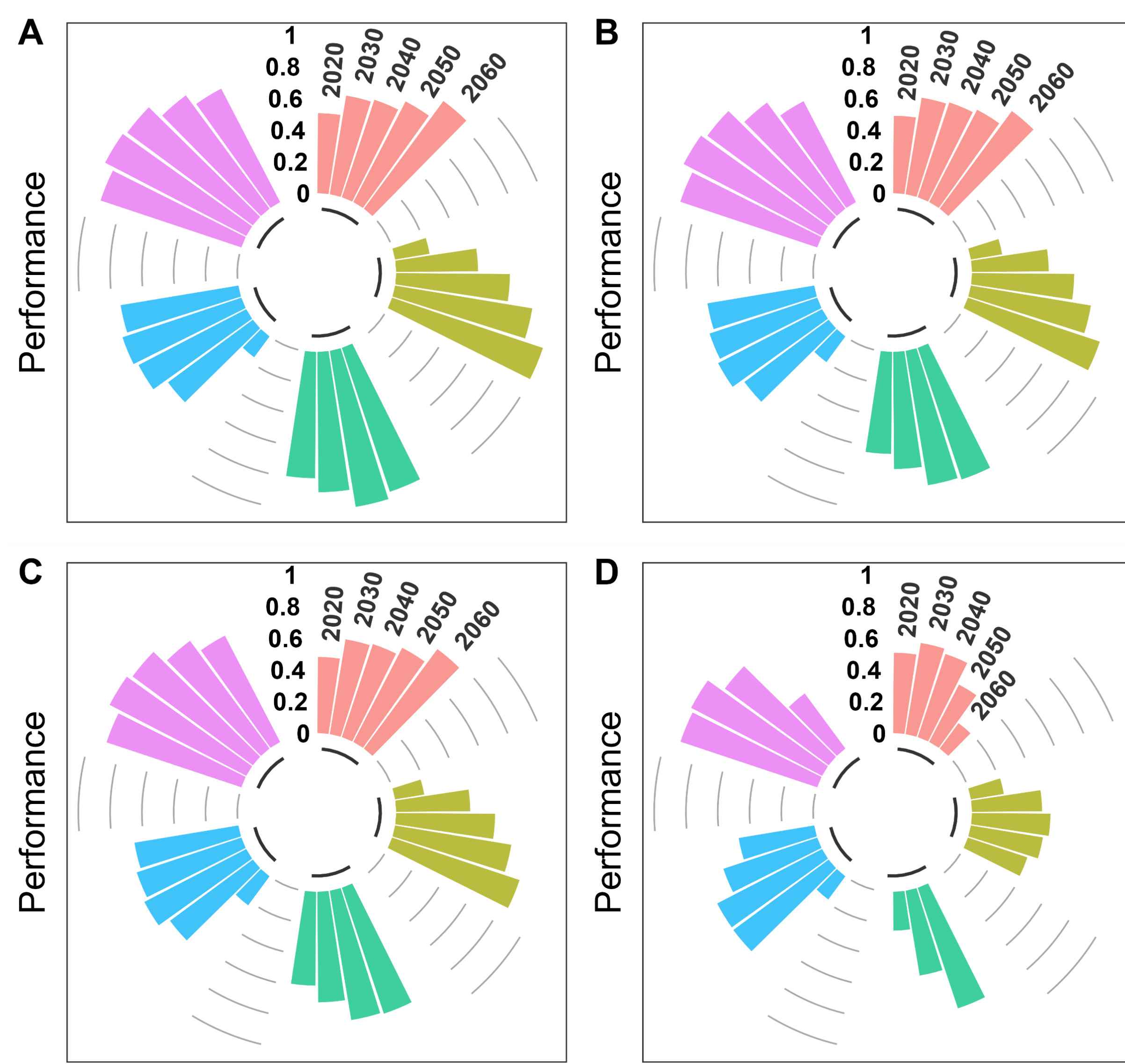
- Simulation of the development of the 24 representative stands
- Simulation period of 40 years, in 5 year steps
- Simulation software: WaldPlaner (Hansen & Nagel, 2014)



### Evaluation of forest ecosystem services



## Results



Legend: Biodiversity (red), Carbon (green), Economic loss\* (blue), Timber (orange), Visual Attractiveness (purple)

\*Lower values (shorter bars) for economic loss are better.

- Biodiversity shows a slight increase over the simulation period for A-C. The strong decrease under D is mainly driven by lower natural deadwood volumes and lower height & diameter variability.
- Carbon: The increase under A-C is mainly driven by increasing volumes of standing timber. Carbon is lowest under D due to the shelterwood system.
- Economic loss is lowest under D, whereas the other FES are less well fulfilled (trade-off between low economic loss and high performance of other FES).
- Timber: A strong increase in standing volume (A) goes hand in hand with lower timber utilization. High harvest volumes (D) can compensate for lower standing volume.
- Visual attractiveness has a U-shaped trend (A-D). Under D, the decrease and the values are lowest due to the shelterwood system.

➔ The biggest differences in the performance of the FES in the considered CSR can be observed between the harvesting methods (single-tree/shelterwood). Within these respective methods, there are only minor differences between the FES.