

# De rol van bossen in de CO<sub>2</sub> balans

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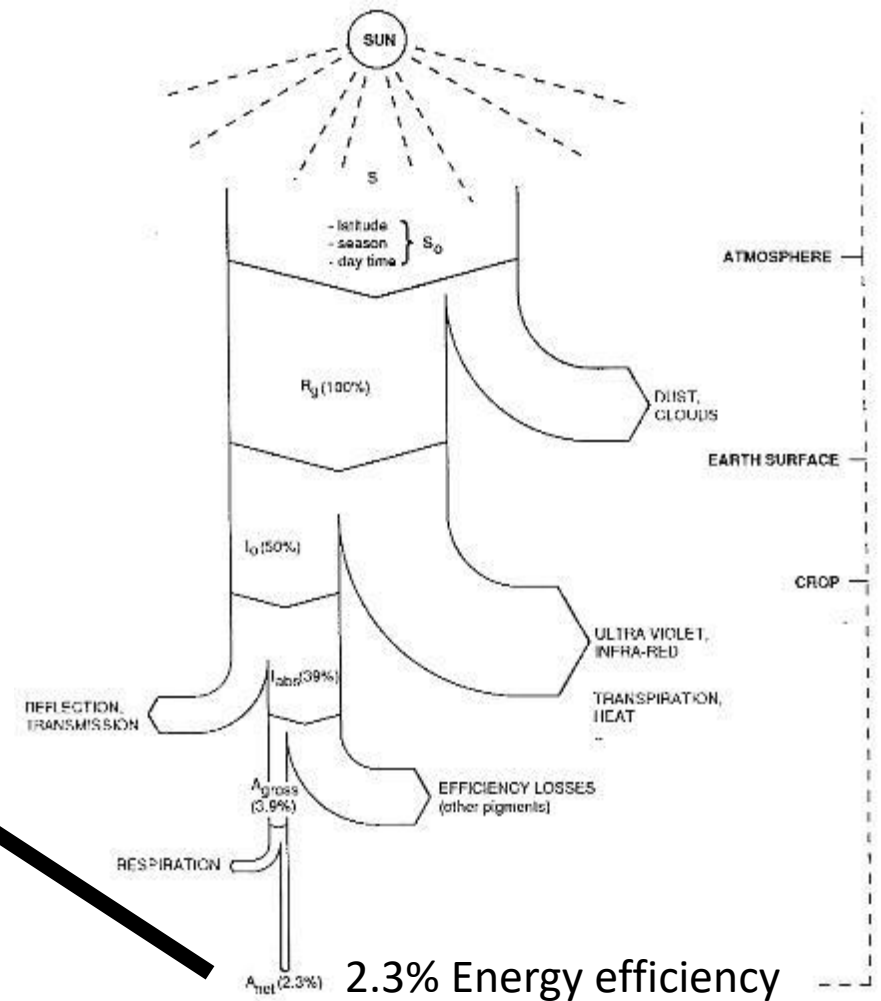
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# Energy conversion



**Annual actual efficiency**  
 0.5 % temperate  
 2.3 % year-round (tropical)



**eiwitten**  
(H,C,O,N,P,S)

**vetten**  
(H,C,O)

**zetmeel**  
(H,C,O)

**lignine**  
(H,C,O)

**Leaves,  
Stem,  
Roots,  
Storage**

# C balance Netherlands forests

330 kha forest in 1991  
310/326 kha forest in 2013

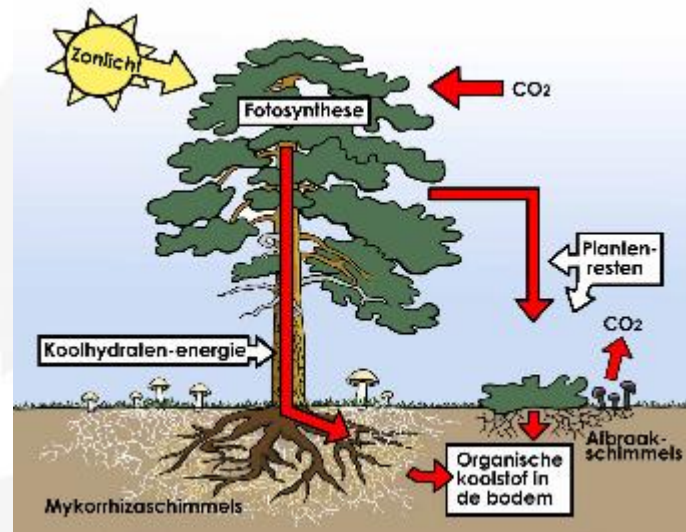
110 Deciduous Trees  
90 Conifers  
120 Mixed

## Total

Living mass 18.7 Mt  
(65% in trunk)

Litter 8.2 Mt

Stable OM 36.8 Mt



## Per Hectare

Living mass 57 t ha<sup>-1</sup>

Litter 25 t ha<sup>-1</sup>

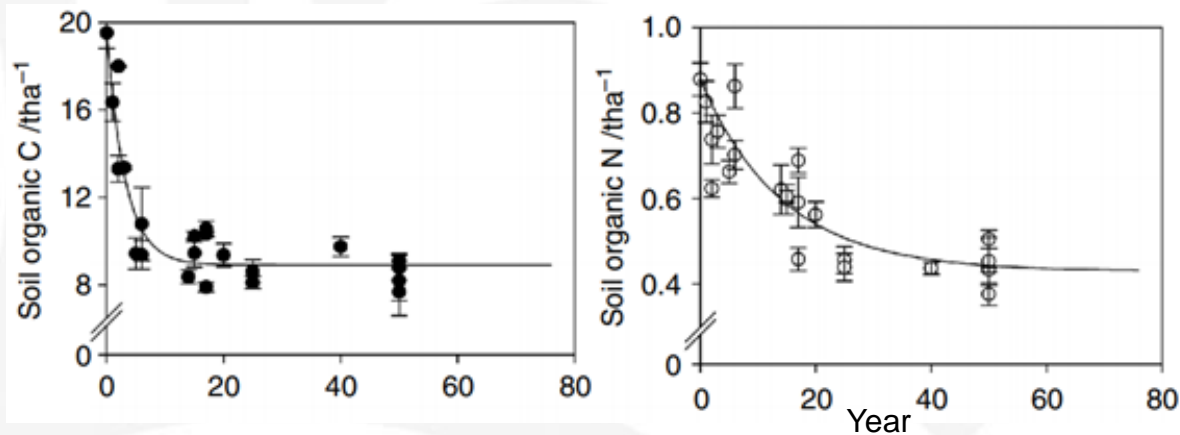
Stable OM 110 t ha<sup>-1</sup>

Average growth rate: 1.9 t C ha<sup>-1</sup> y<sup>-1</sup>

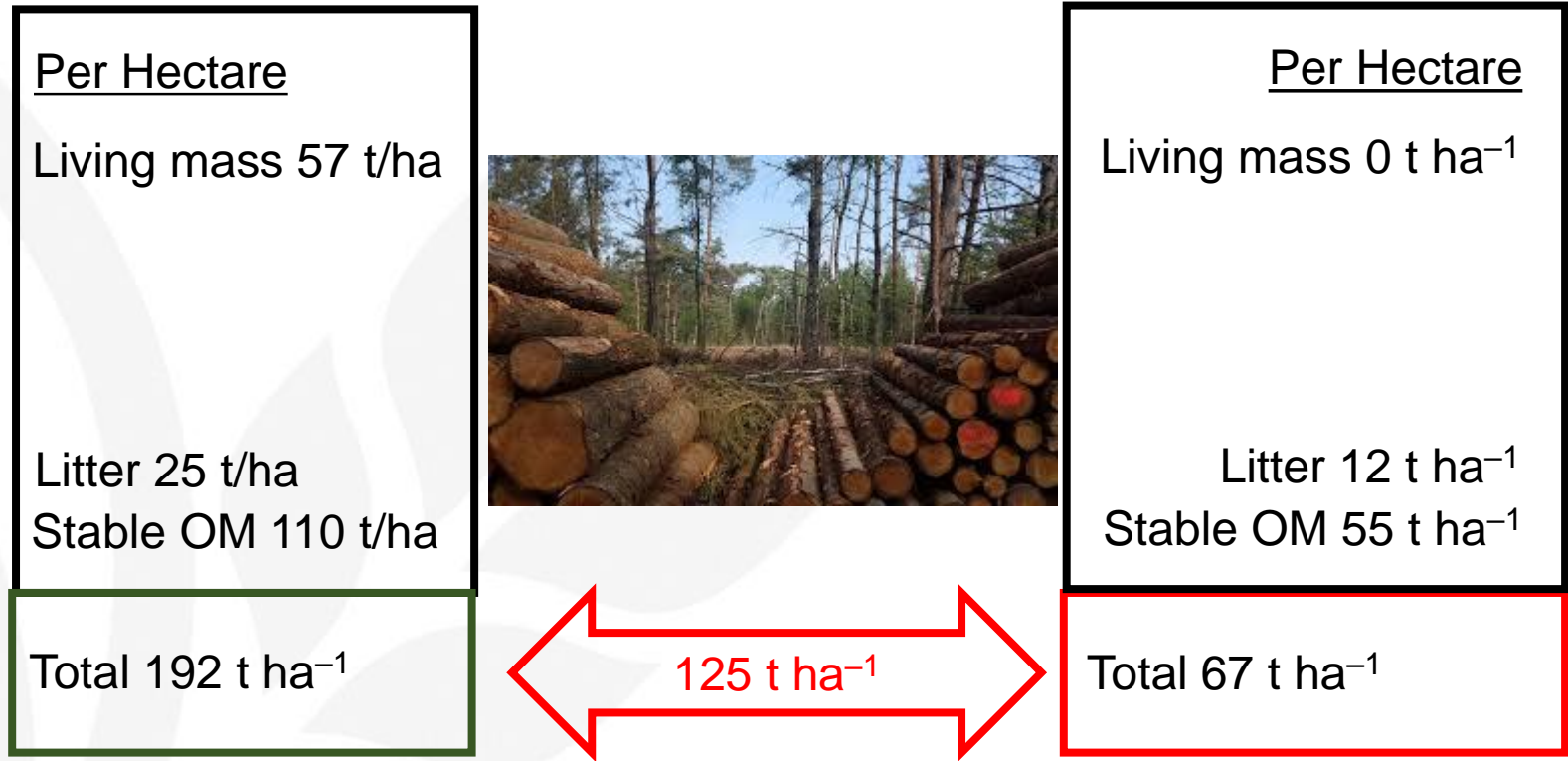
Harvest ±50% →  
0.9 t C ha<sup>-1</sup> y<sup>-1</sup> net growth

# Forest clearing

- Removal of living biomass
  - Trunks for wood
  - Chips for fuel
- Litter
  - Exposed and degrades
- Soil Organic Matter
  - More than 50% loss of Carbon
  - More than 40% loss Nitrogen



# Total Carbon loss



# Carbon sequestration

Average growth rate:

$1.9 \text{ t C ha}^{-1} \text{ y}^{-1}$

Potential Soil Organic Carbon sequestration forest land (Europe):

$0.1 - 0.6 \text{ t SOC ha}^{-1} \text{ y}^{-1}$

Rebuilding  $125 \text{ t C ha}^{-1}$ :

30 years – above ground

100-500 years – Soil C



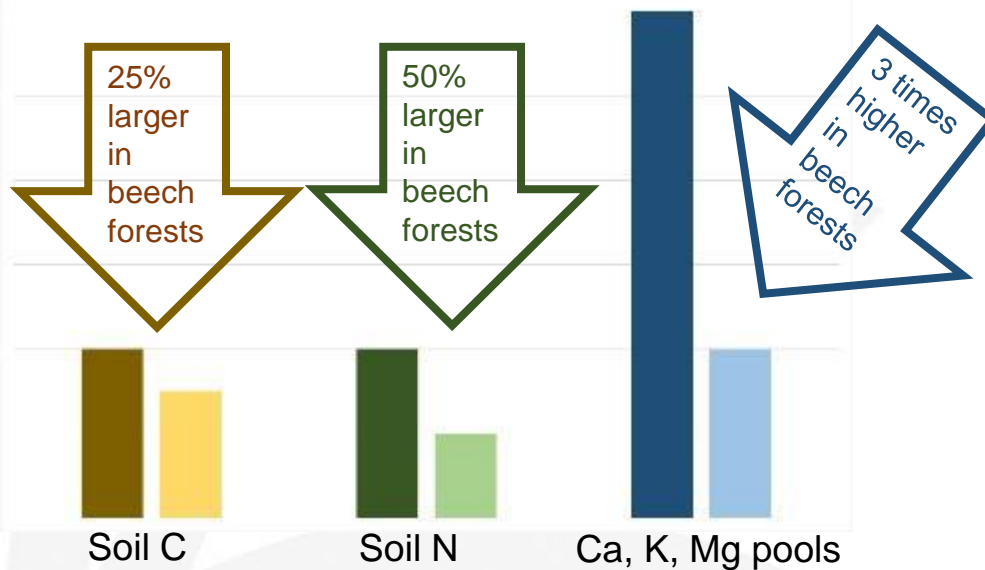


# Actual sequestration

Native temperate broad-leaved forests  
Cleared for cultivation in Middle Ages  
Replanted with pine plantations (*Pinus sylvestris*)



After more than **100** years of pine forest



Limited soil C and nutrient storage potential of Scots pine plantations on sandy soils

# Changing climate

- Increasing atmospheric CO<sub>2</sub>
  - Increases growth rate
- Increased temperature
  - Increased transpiration
- Drier summers
  - Water stress reduces growth rate
- Resilience
  - Soil Organic Matter essential
    - Proper soil structure
    - Nutrient and water holding capacity
    - Soil health
  - Limit C and nutrient losses due to harvesting
- Identify more balanced harvesting techniques





# Closing remarks



- Forest clearing
  - Collapse in Carbon (N, and nutrients)
  - Rebuilding in > 50-100/300 years
- C sequestration broad leaf forest > conifers
- Likely more abundant micro-fauna under oak than pine