



SUPERB

Upscaling Forest Restoration



LIFE
Climate
Forest



Bosgroepen

Enhancing Forest Resilience

Etiënne Thomassen and Maaïke de Graaf

06-10-2023



Bosgroepen

Content

1. Climate smart forest management (Climate Forest)
2. Improvement of soil conditions (SUPERB)



Bosgroep Zuid Nederland

Cooperative of forest and nature owners

Bosgroep Zuid Nederland (BgZN, reference date 31-12-2022)

577		Members of the cooperative
143.371	ha	Total area of all members
44.311	ha	Area excluding large org. (TBO's)
16.305	ha	Area managed* by BgZN

* extent of tasks varies between members





LIFE Climate Forest: hoe je met klimaatslim bosbeheer de veerkracht van bossen kan vergroten

Bosgroepen Staatsbosbeheer

30-MRT-2021 - Iedereen ziet en ervaart een bos op een eigen manier. Dus als we vragen hoe het bos van de toekomst eruit moet zien, zullen de antwoorden ongetwijfeld verschillen. Toch zal er vermoedelijk één gemene deler zijn. Namelijk dat het een vitaal bos is; gezond en veerkrachtig! Hoe je daar met klimaatslim bosbeheer aan kunt bijdragen, staat centraal in het project LIFE Climate Forest.

er!

haal

soorten, bodems en
I niet mogelijk om
te stof verdriest
tekap. Op grond
shaten we voor
in na kraalkap
rootte van 20-
eenkomend
per hectare).
verlies van
kraalkap. Dit
rd omdat de
kraalkap van
nlanden

svlassen
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v dit
tan in
an
dei

bossen. © Bosgroep Zuid

**uit de lucht:
:art
rst**

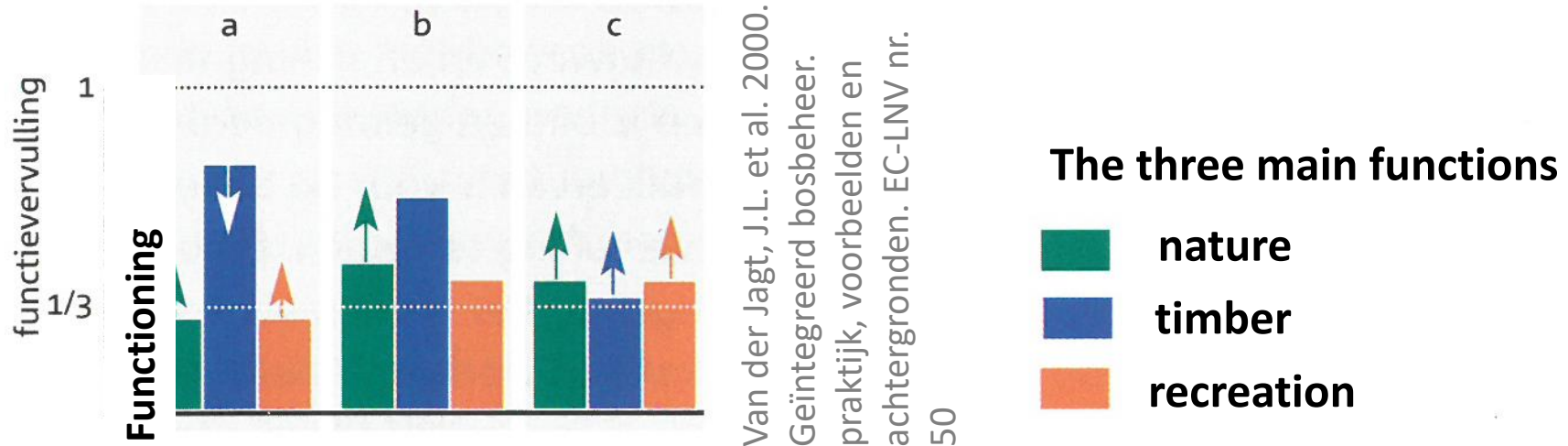
**Maashorst ‘operatie steenmeel’,
gemalen steen over de bossen gaat**

uitstrooien. In enkele dagen tijd wordt in totaal bijna 600.000 kilo gedropt.



Geïntegreerd bosbeheer

Integrated forest management

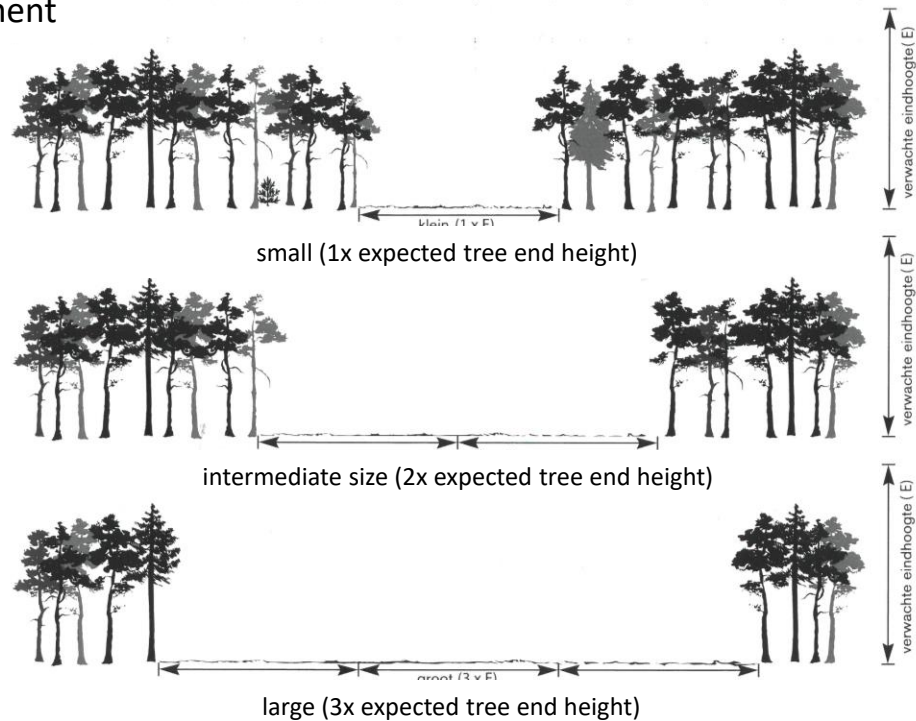
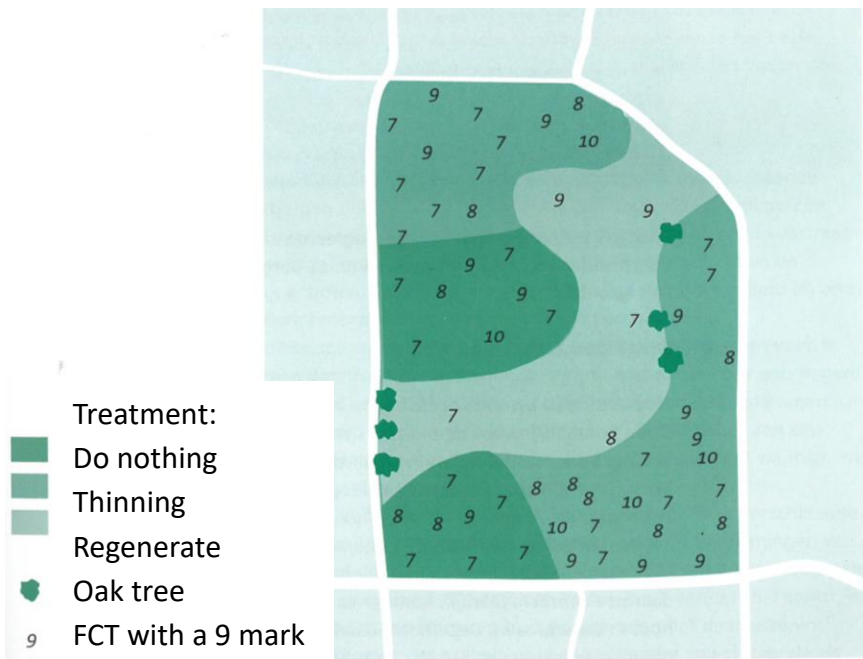


- a Promote trees with nature and recreation qualities; loss of timber production
- b Girdling trees with poor timber quality; improves 'nature'
- c Group selection @ spot with poor timber quality along path; improves all three

Geïntegreerd bosbeheer

Integrated forest management

Map with example integrated forest management treatment



LIFE Climate Forest

Enhance resilience of forests on sandy soils through climate change adaptation and increasing biodiversity.

Method

show how you can increase resilience in for climate change in exemplary forests



Adaptation first!

- LIFE Climate Forest: Focus on adaptation
- By increasing resilience

Building blocks

- **Protect existing qualities**
 - Soil, verzorgende oogst (dunningspaden), biodiversity
- **Restore/enhance site conditions**
 - Hydrology, nutrients, rich litter species
- **Facilitate natural adaptation** (nat. regen.)
- **Enhance trees species diversity**
 - Indiginuous, naturalized, new
- **Enhance structural diversity** (stab., flex. & recovery)
- **Utilize forest climate** (buffer extremes)





Species diversity 2
Functional diversity High
Functioneal redundancycy Low



Species diversity 6
Functional diversity High
Functioneal redundancycy High

Nyssen et al (2023) *Ingeburgerde bomen in klimaatslim bos*. De Levende Natuur **124**(2). Adapted from Messier, C., et al., (2019). *The functional complex network approach to foster forest resilience to global changes*. Forest Ecosystems **6**(1): p. 1-16.



Gereedschapskist
Klimaatslim Bos- en Natuurbeheer

Factsheet *Cedrus atlantica* – Atlasceder en *Cedrus libani* – Libanonceder¹

Algemene introductie

Atlasceder (*Cedrus atlantica*, synoniem *C. libani* subsp. *atlantica*) en Libanonceder (*Cedrus libani*) zijn naaldboomsoorten behorend tot de dennenfamilie (*Pinaceae*). Beide ceders zijn niet inheems in Nederland. Beide ceders zijn pionierboomsoorten en komen van nature in zowel monoculturen als in menging met onder meer dennen-, eiken-, jeneverbes-, sparren- en esdoornsoorten voor.

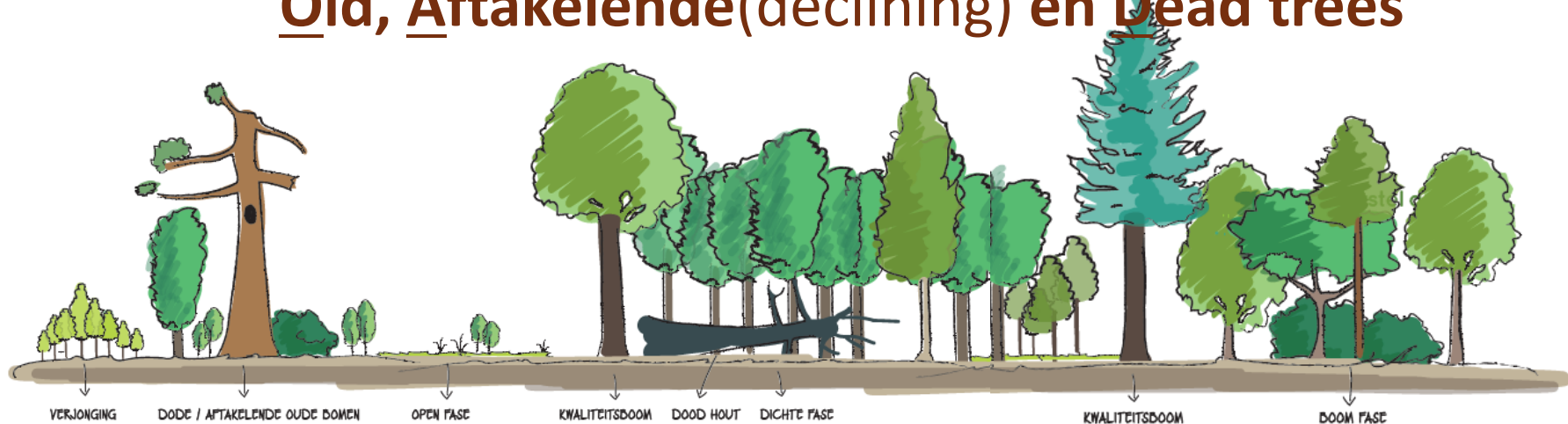
'Good' vs 'Climate Smart'

- **Unchanged: take sensible (smart) measures**
- (sense of) **urgency!**
- **What worked in the past, might no longer work in the future**



OAD-network

Old, Aftakelende(declining) en Dead trees



- **Percentage reserved for stage of decline**
- **Part unmanaged area** (whole stands or part of stands)
- **Scattered habitat trees and groups**
which are allowed to fulfill entire lifecycle

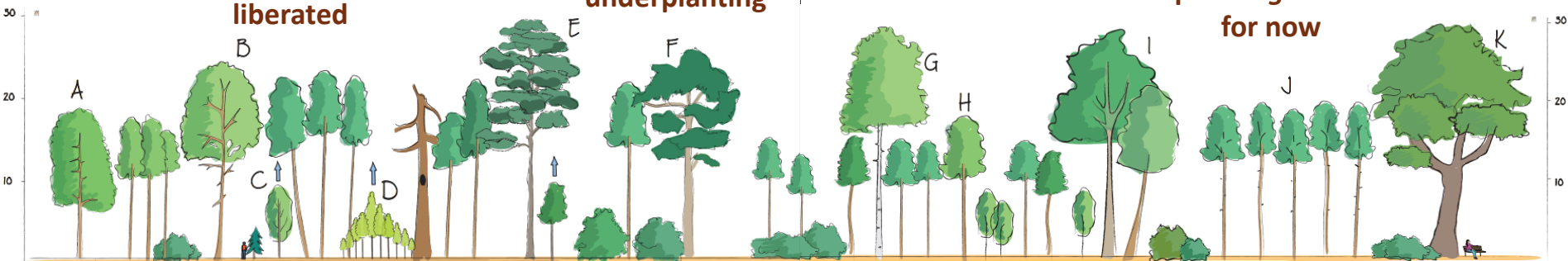
Towards selection forest (CCF)

'boomgericht bosbeheer' / 'tree oriented forest management'

Emerging FCT (C) will be pruned and liberated

Large FCT (F) can ripen with sufficient light for underplanting

Low quality patch 'ignored' for now



FCT (A) will be liberated anew

Promising Shade tolerant promising tree
Does not need additional light yet

2 FCT's (G&H) in close proximity
'Zeitmischung'

Habitat Group (I)

Eye-catcher (recreation)





Malpiebossen, Valkenswaard

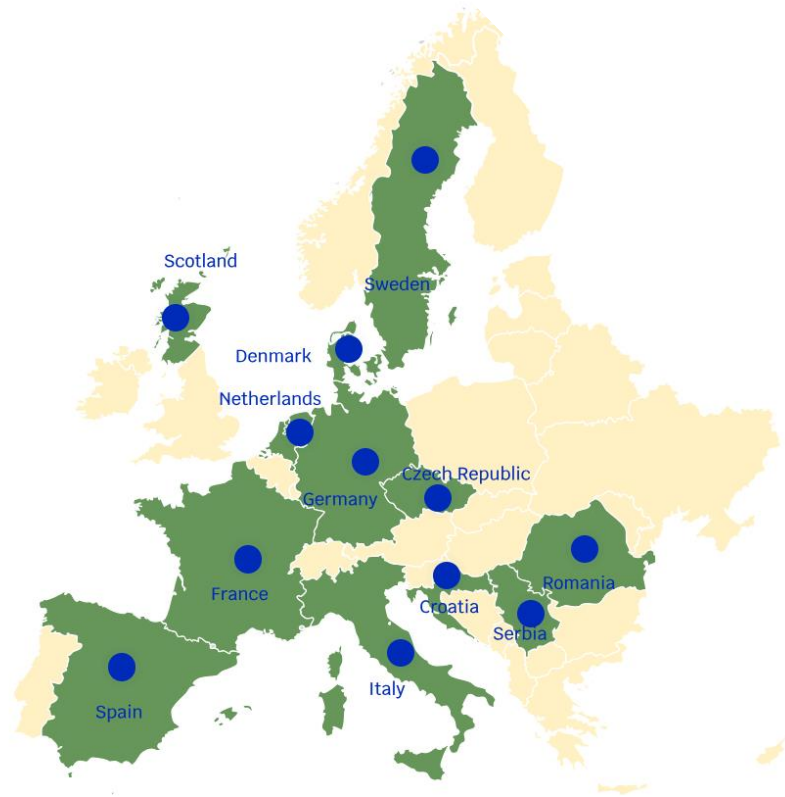


- **Systemic solutions for upscaling of urgent ecosystem restoration for forest-related biodiversity and ecosystem services**
- Horizon 2020 Research and Innovation Programme (EU Green deal)
- Science and practice:
 - Forest management practices
 - Biodiversity and Ecosystem services
 - Stakeholders and communication
 - Governance
 - Economics
 - Climate adaptation aspects



**Upscaling
forest
restoration**

12 Demo Areas



Restoration goal:

Revitalisation of 100 ha of pine forest

Challenges

- homogenous forest (*Pinus sylvestris*, *Pinus nigra*)
- soil degradation (acidification, N-enrichment)
- habitat fragmentation
- climate change
- recreational pressure
- small owners



1900, southern Netherlands



<https://boslessen.nl/deel-3-ons-bos/les-5-geschiedenis>





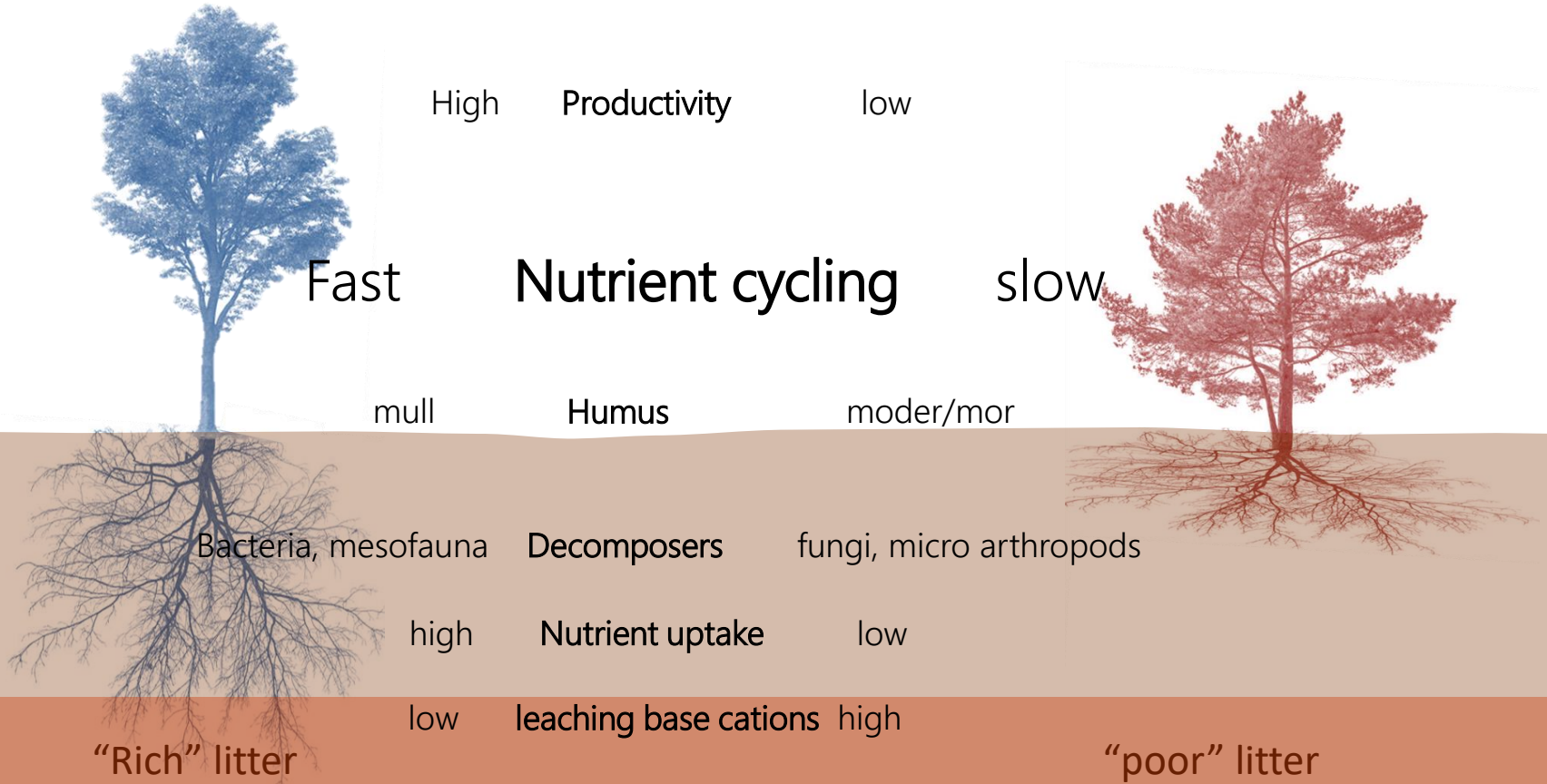
What if soil quality is hampering forest vitality?

Soil restoration methods:

1. Increased nutrient cycling by utilization of minerals within the rooting zone:
revitalisation with rich litter species
2. Application of missing minerals by rock dust



Rich litter species - concept



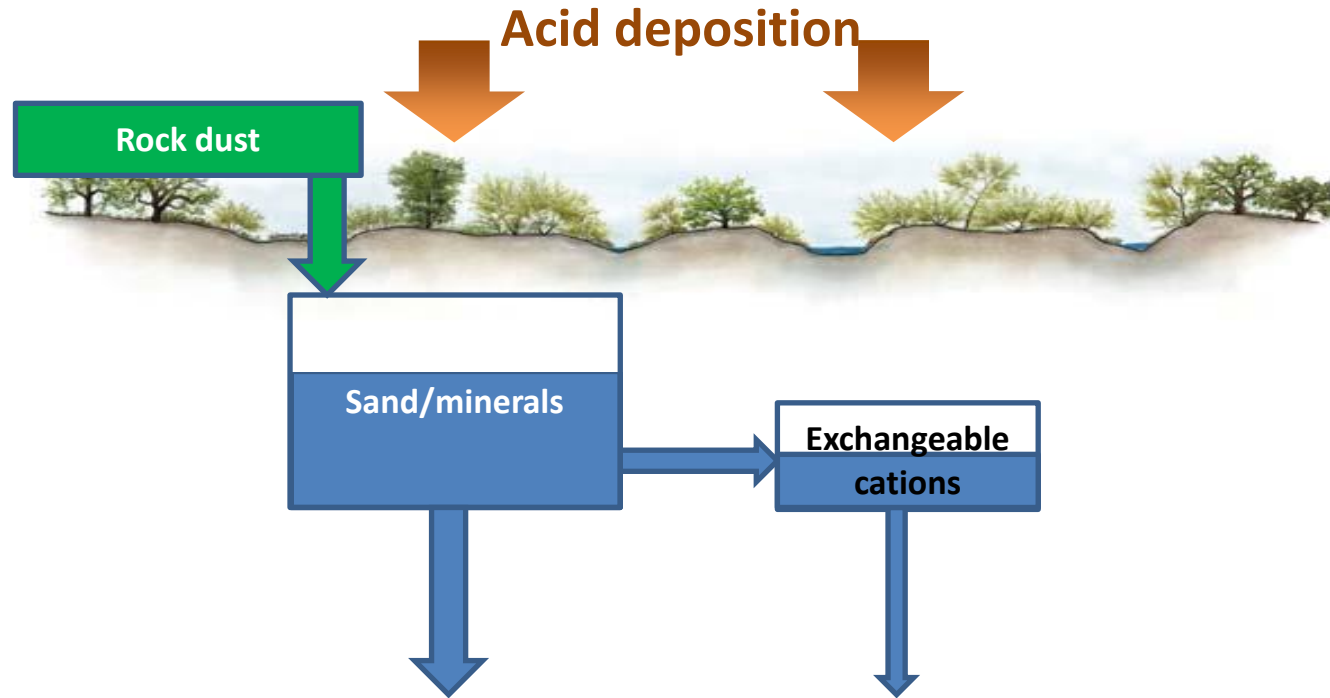
Revitalisation with rich litter species

Ambition: > 30% rich litter species in the canopy

- by planting
- by selective thinning

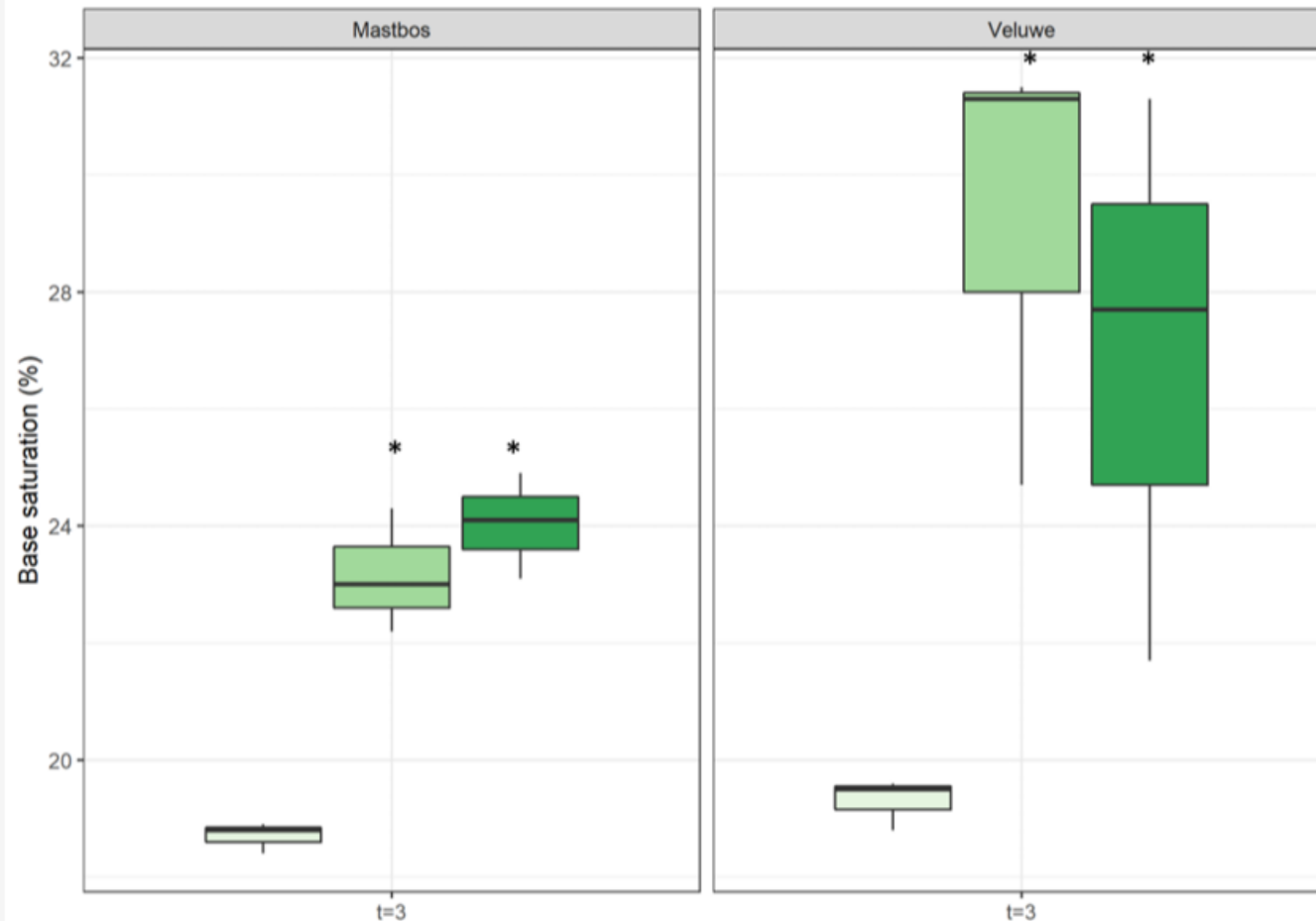


Application of rock dust: replenishing lost minerals



Application of rock dust





Eifelgold:

Van <20 % in controle naar ca. 23% (Mastbos) en ca. 30 % (NPHV)





Soilfeed:

Van < 20 % in controle naar ca. 24% (Mastbos) en ca. 27 % (NPHV)

Niet alleen Ca maar ook duidelijk K (met name Soilfeed) en Mg (Eifelgold)

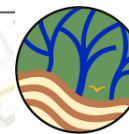
Maximale pH-stijging: 0.3 eenheden

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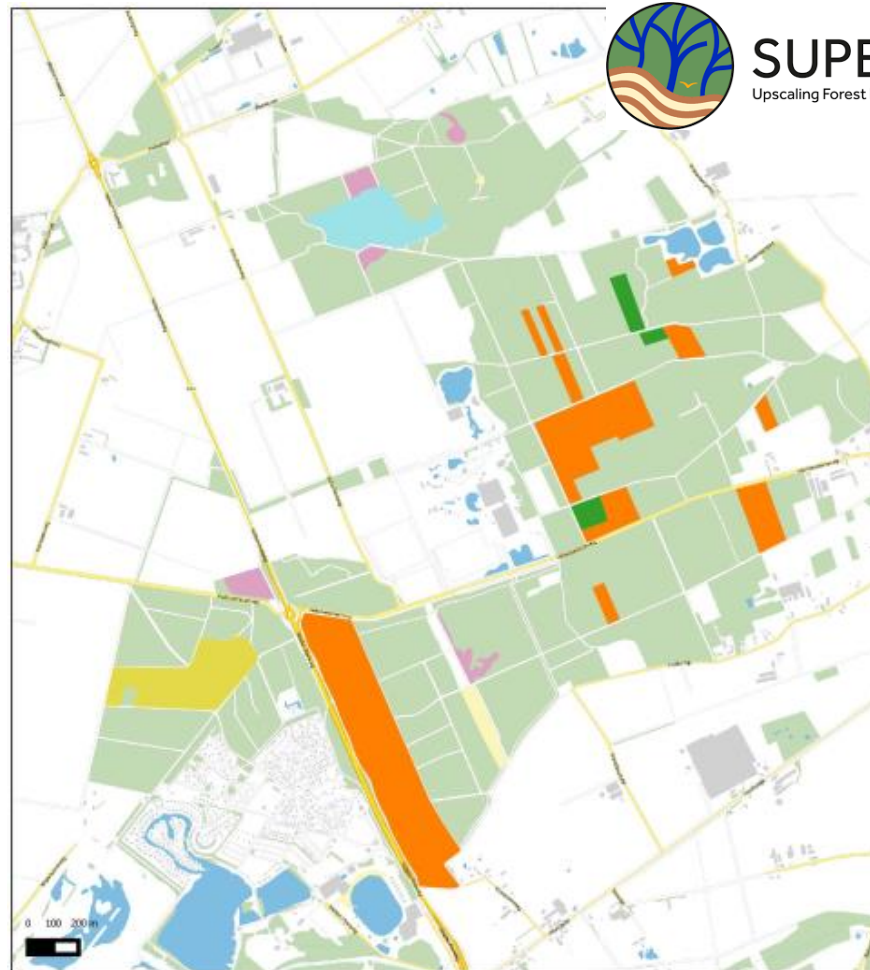
-  Rock dust
-  Rock dust and rich litter species
-  Rich litter species
-  Rock dust and chalk and rich litter species

Area:

- rock dust: 69 ha
- rich litter species: 55 ha, 150 trees/ha



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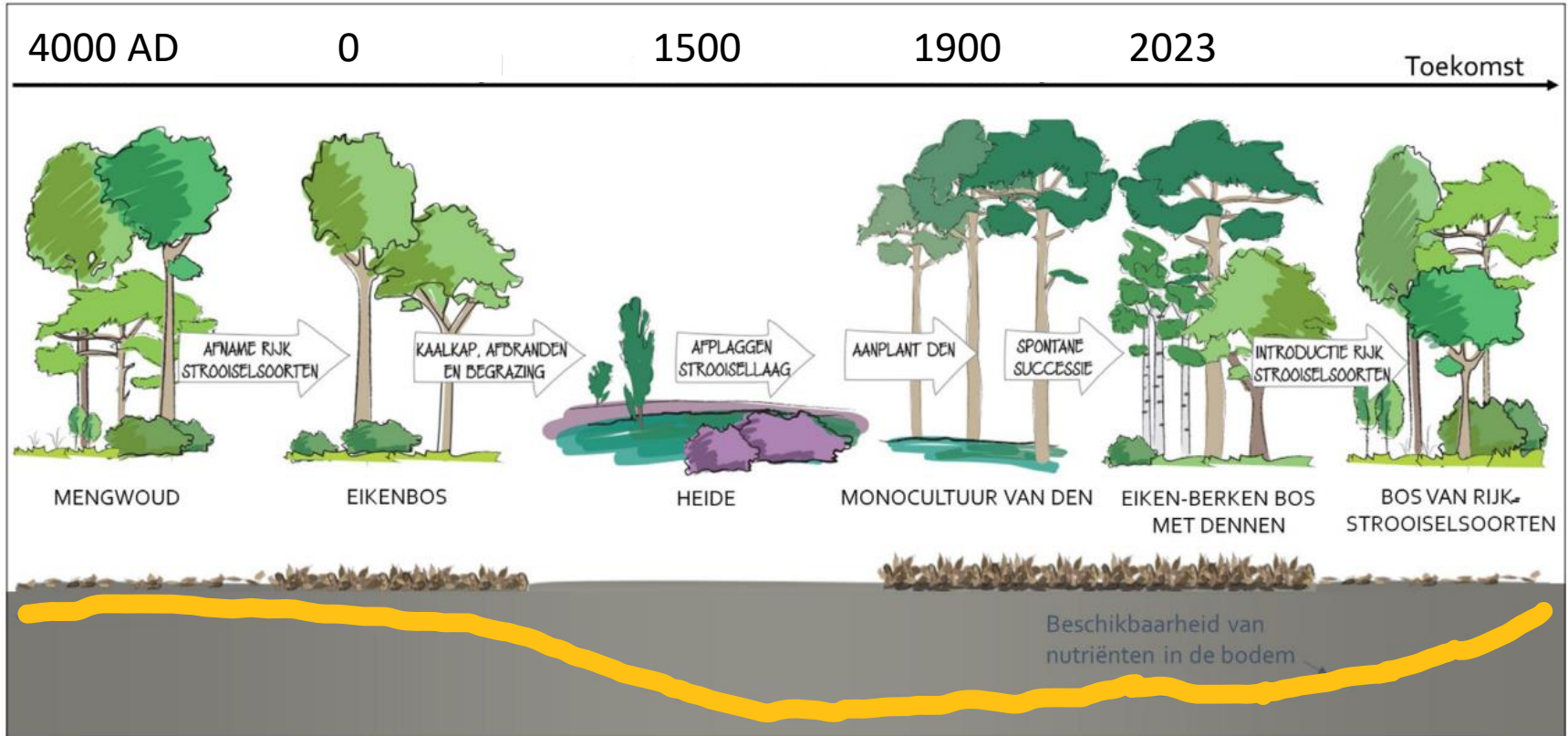




Bosgroepen

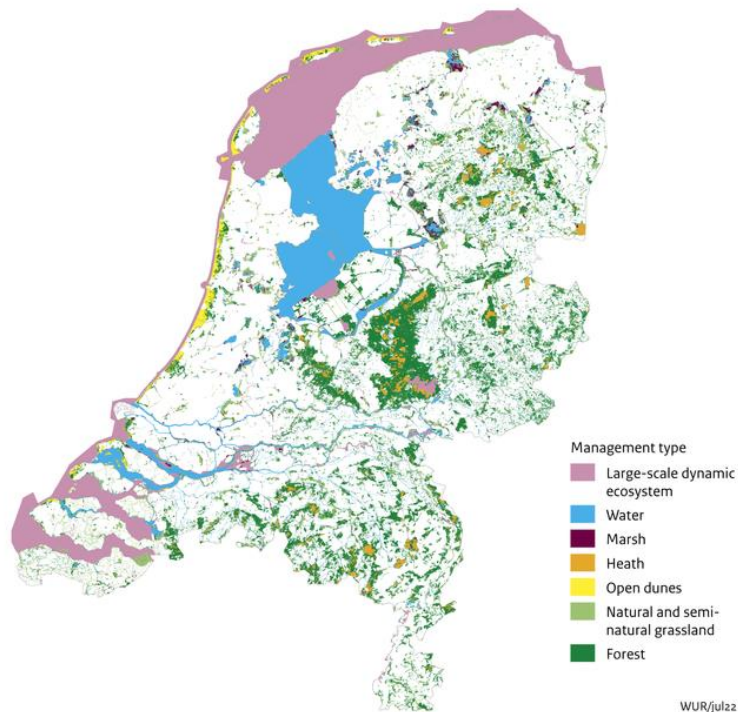
Thank you for your attention!

History of the forest landscape on sandy soils



The Dutch forest landscape

Ecosystem types in the Nature and Landscape Index, 2021



Source: Provinces, IPO

WUR/jul22
www.dlo.nl/em54405

Grondsoorten

