

# The Netherlands

Actions priorities and needs for forest management under climate change

Gert-Jan Nabuurs

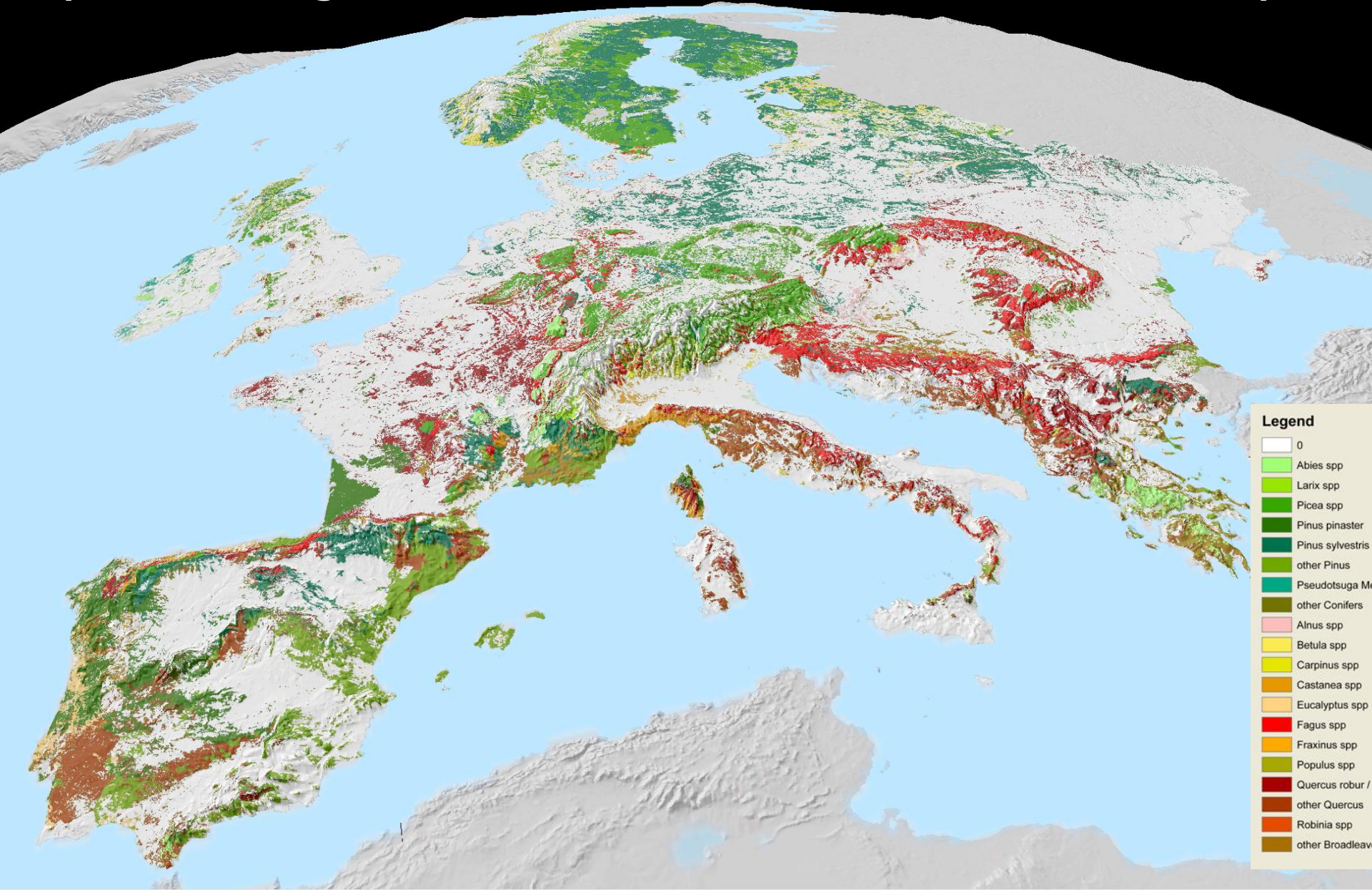
Professor European Forest Resources

Bialowieza, 21 April 2015



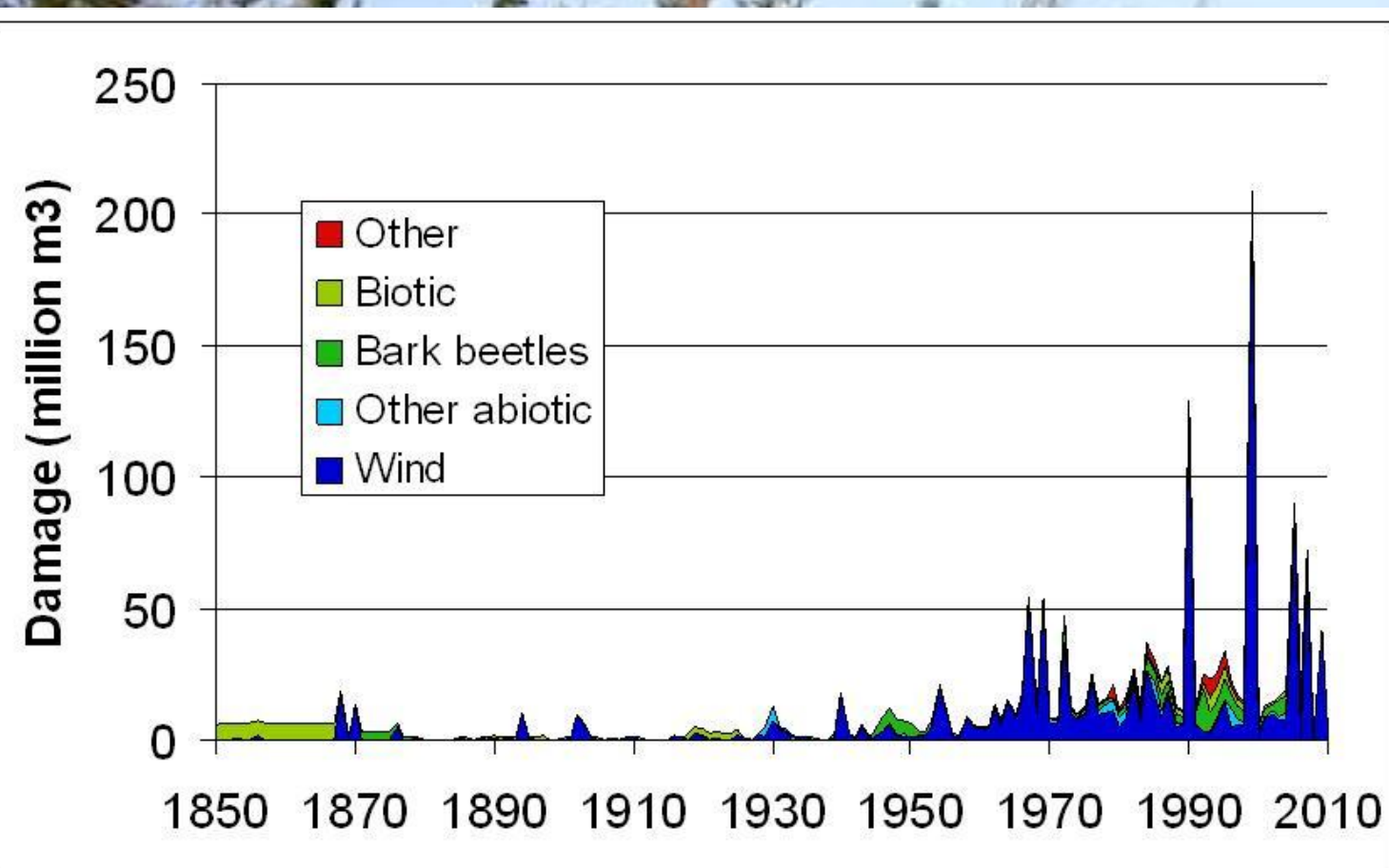
- Few slides about Europe
- Dutch forests
- Forest Management under climate change

# European forests, 1x1 km, tree species map (Brus, Hengeveld, Heidema, Nabuurs, Gunia 2011)





# Ever higher growing stocks lead to increased disturbances

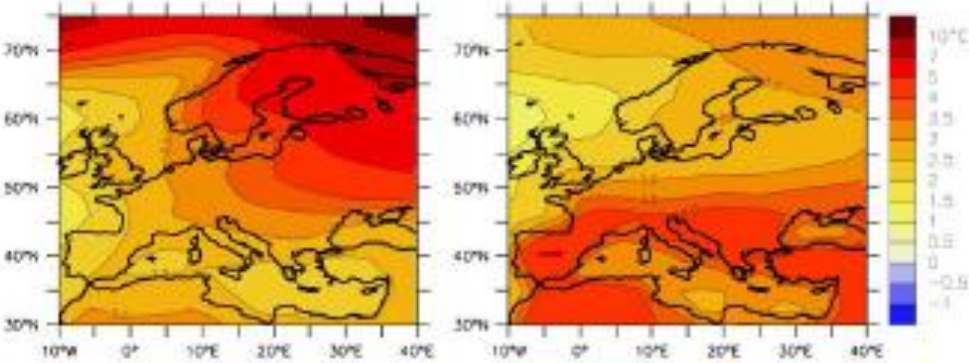


**Volume of  
damage  
(Schelhaas et  
al 2003)**

# Environmental changes

DJF

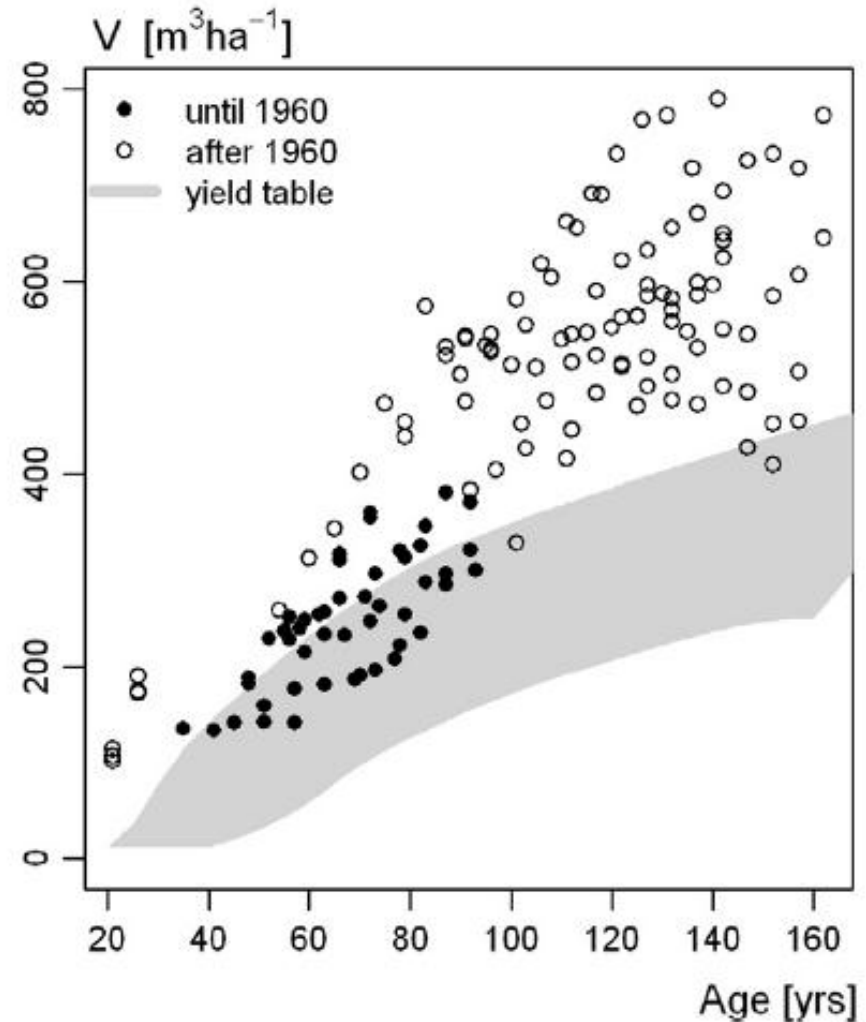
JJA



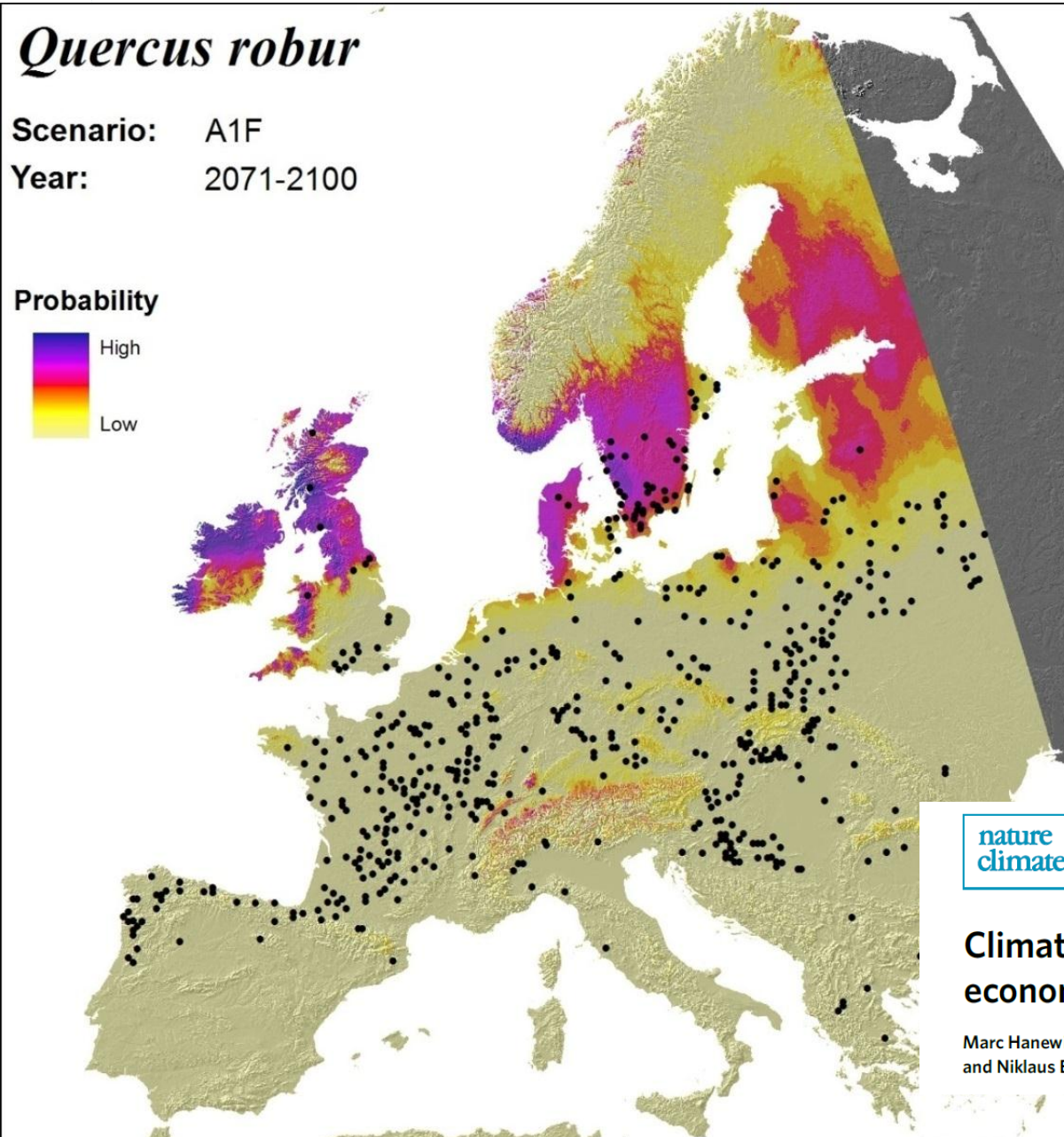
temperature change  
(A1B scenario in 2090)

Oak stand volume

Pretzsch et al. 2014



# Potential future ranges: climate envelope



nature  
climate change

LETTER

PUBLISHED ONLINE: 23 SEPTEMBER 2012 | DOI:10.1038/NCLIMATE1212

## Climate change may cause severe loss in the economic value of European forest land

Marc Hanewinkel<sup>1,2\*</sup>, Dominik A. Cullmann<sup>3</sup>, Mart-Jan Schelhaas<sup>4</sup>, Gert-Jan Nabuurs<sup>5</sup> and Niklaus E. Zimmermann<sup>6</sup>





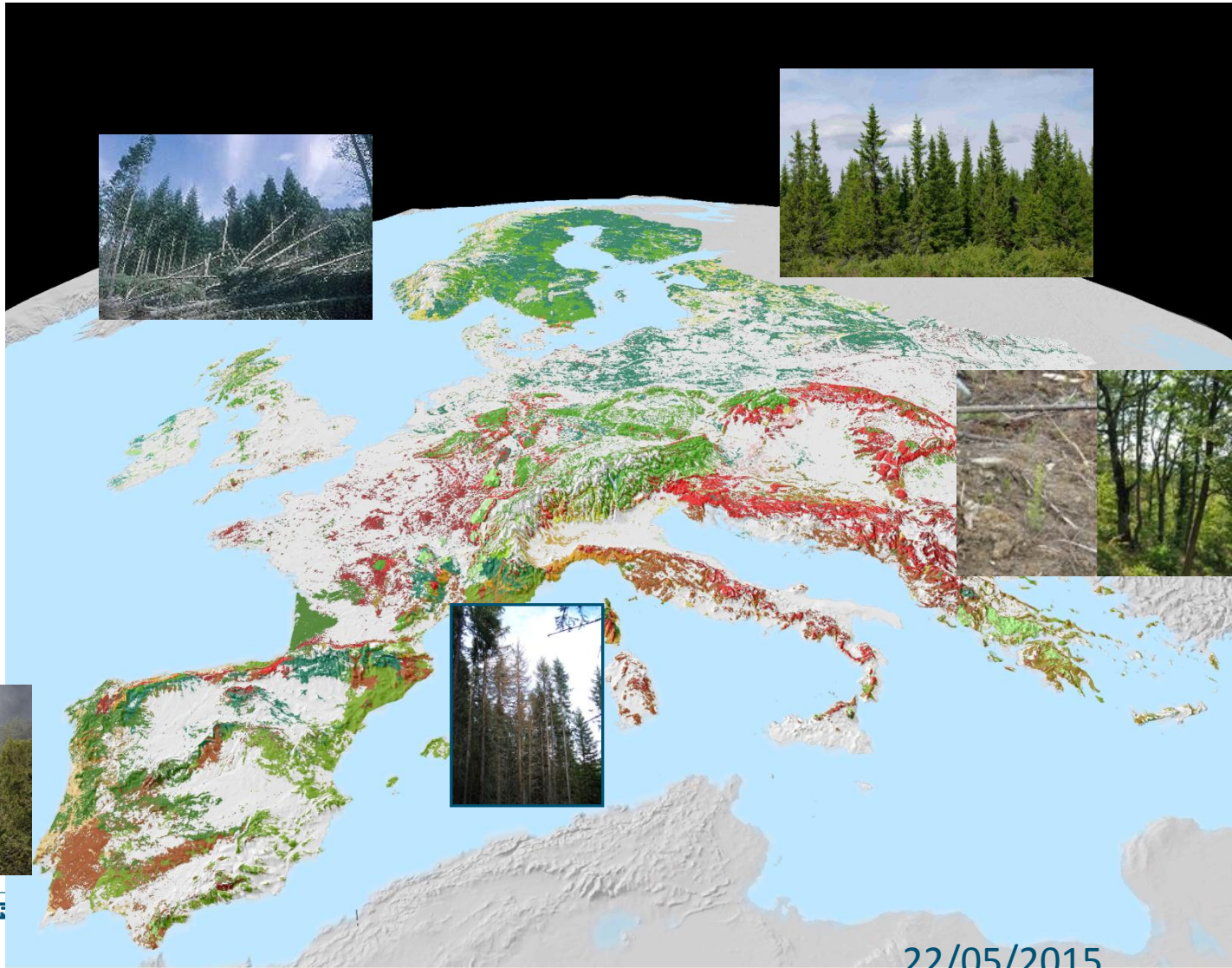
# Facing Climate Change Impacts: highly diverse

**EU27:**

**178 million ha**

**16 million owners**

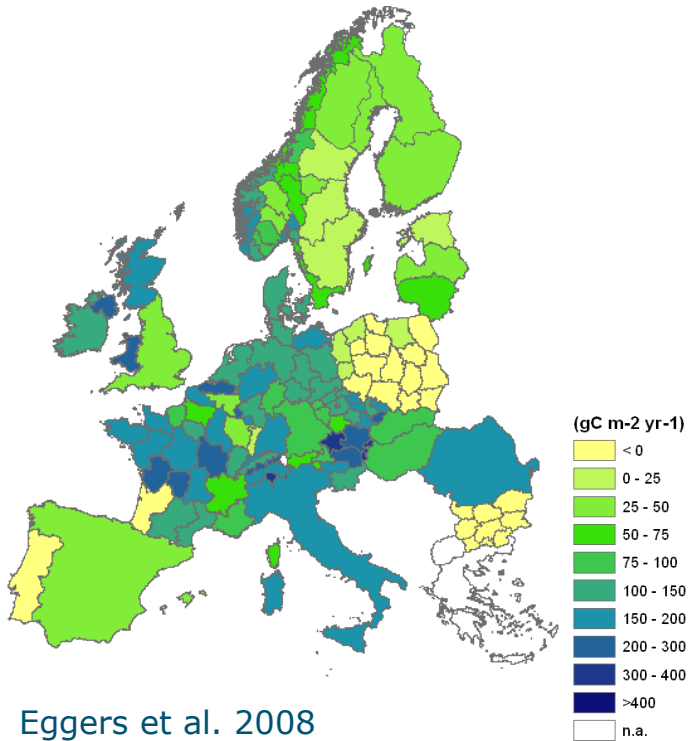
**Multiple services**



**ALTERRA**  
**WAGENINGEN UR**

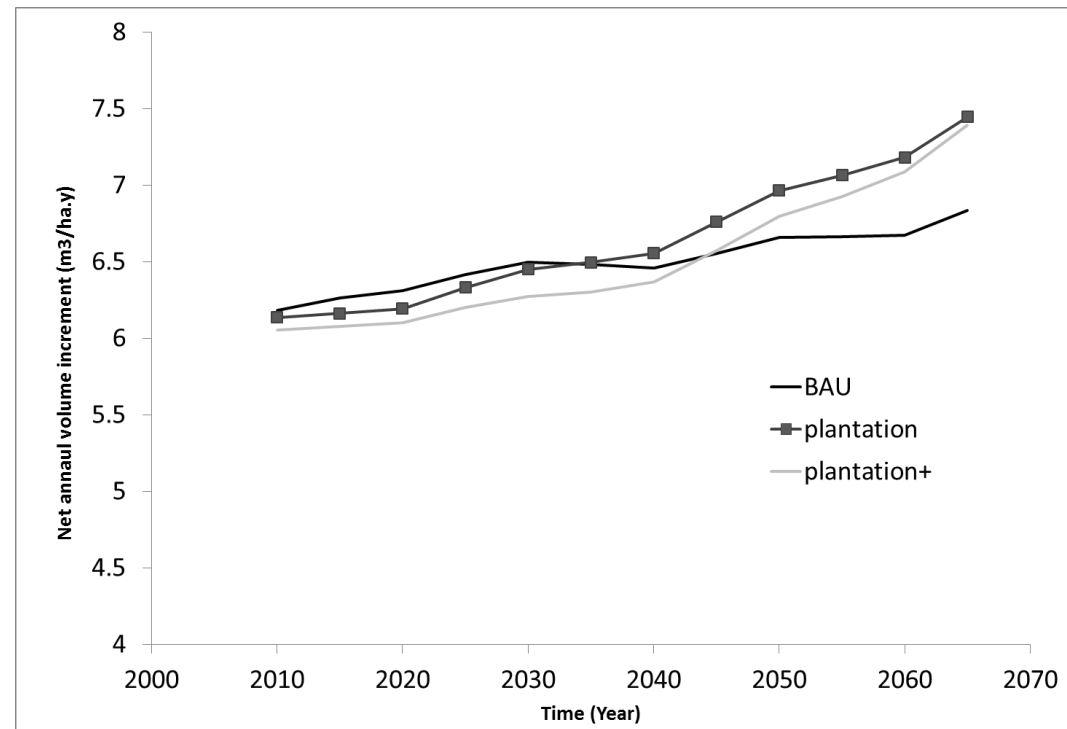
# EFISCEN: Providing insight in carbon balance, and e.g. wood availability

Forest NBP (2000-2005)  
C stock change in trees  
and soil



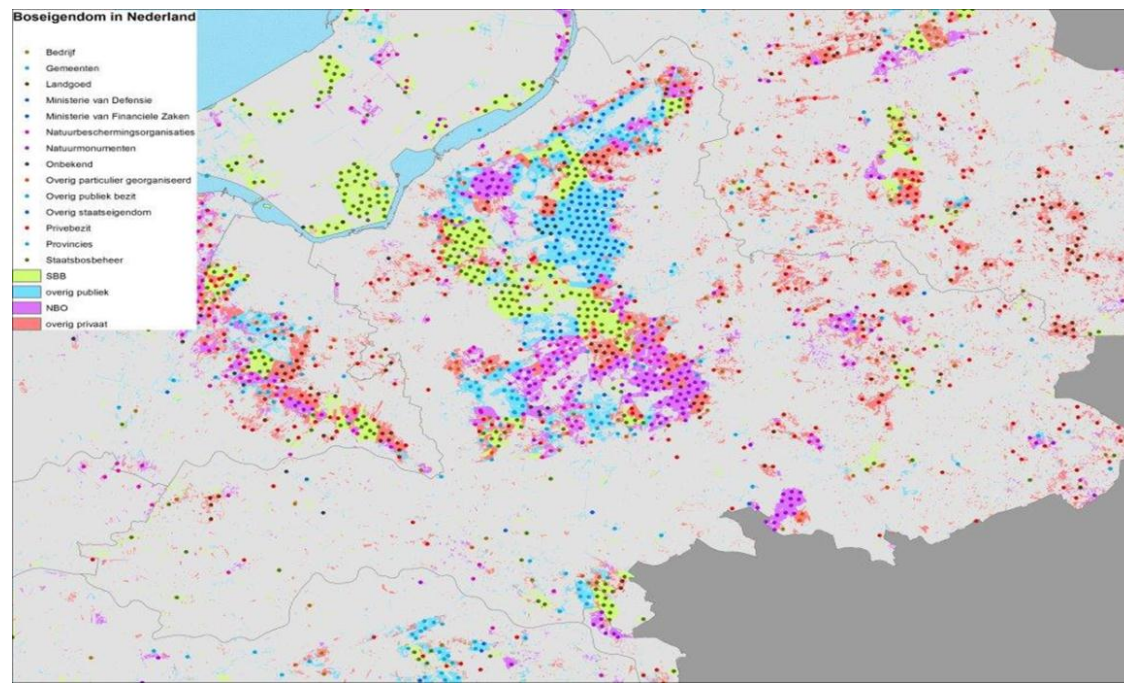
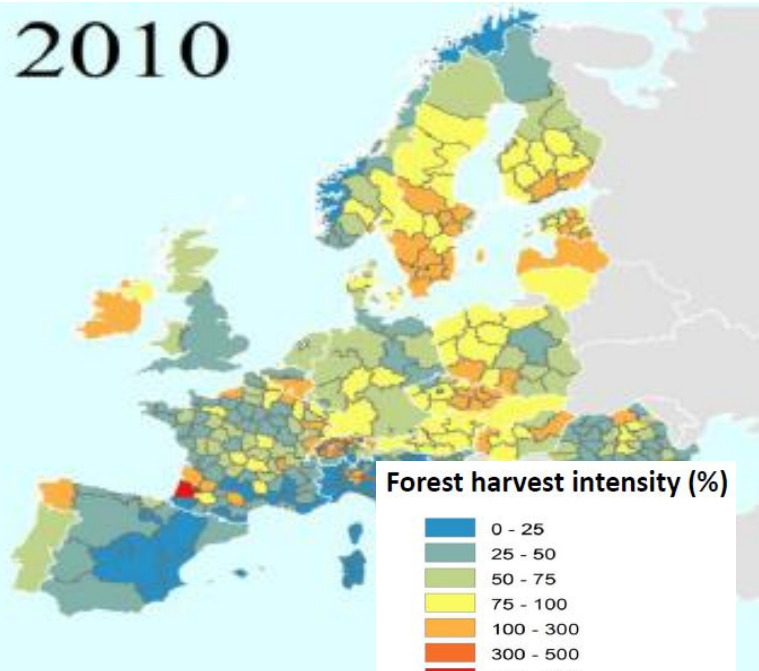
Eggers et al. 2008

Management can change the trend: gradual conversion of European forests to plantations (Nabuurs et al. 2014)





# Developing a high resolution modelling approach based > 300,000 NFI plot data from across Europe. Thanks to NFIs.

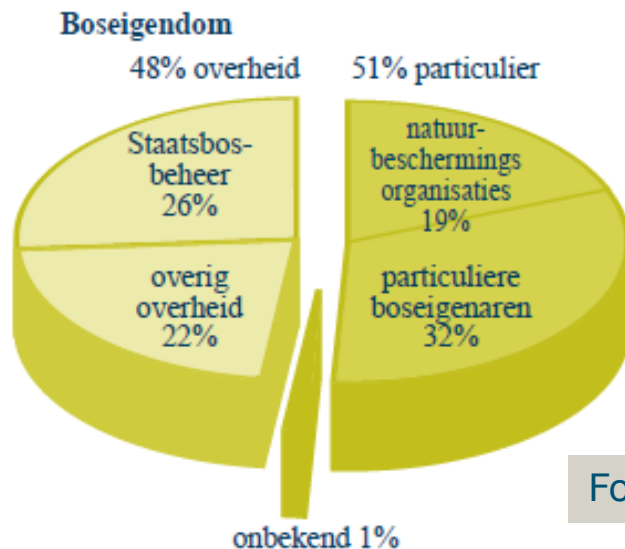
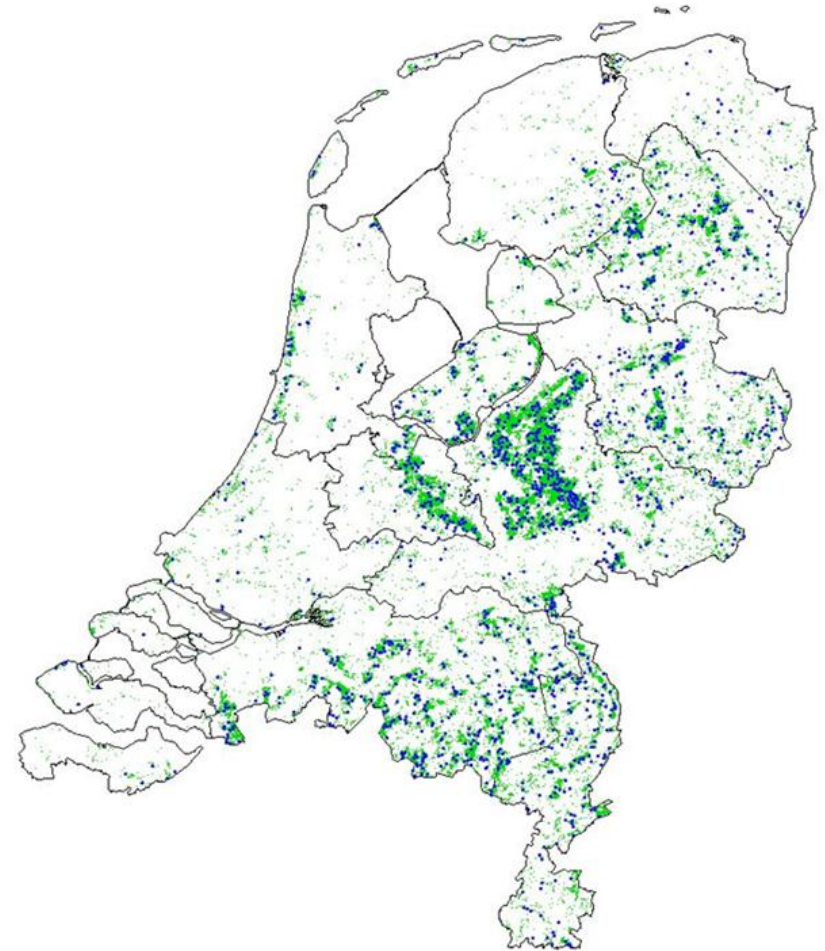


Large parts are hardly used/managed

Levers et al. 2014, Verkerk et al In press

# Dutch forests

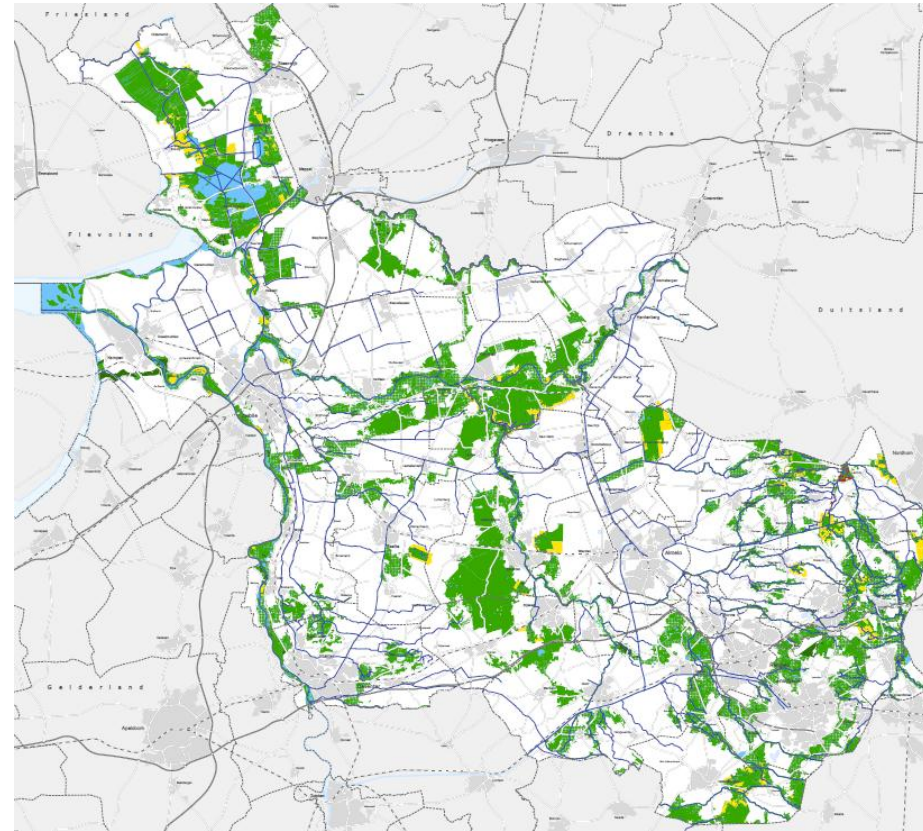
- 373,500 ha
- Gs: 216 m<sup>3</sup>/ha
- Inc: 7.3 m<sup>3</sup>/ha.y
- 1.3 million m<sup>3</sup> fellings



Forest ownership (probos 2014)

# Nature oriented management

- Ecological mainstructure: connecting fragmented nature
- Restoration ecology
- Many small private owners
- Nature is subsidised
- Water management
- Harvest prohibited mid  
March – Oct.
- Services very important  
> 100 million visits per year





- Europe is where we import our wood from
- forest is not invested in
- Hollow forest: getting old, insufficient regeneration

(Schelhaas, Clerkx et al. 2014)

- Oak decline, ash decline
- Weak soil nutrient balance

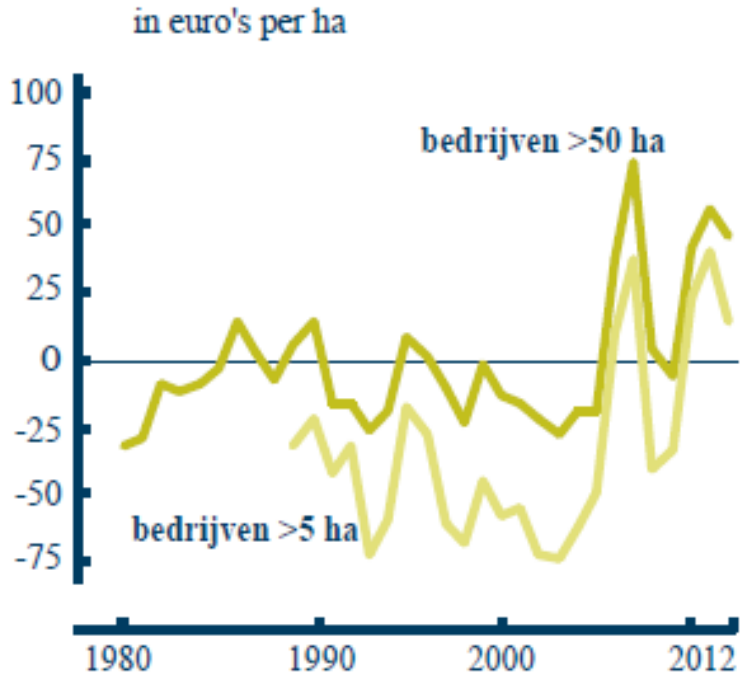




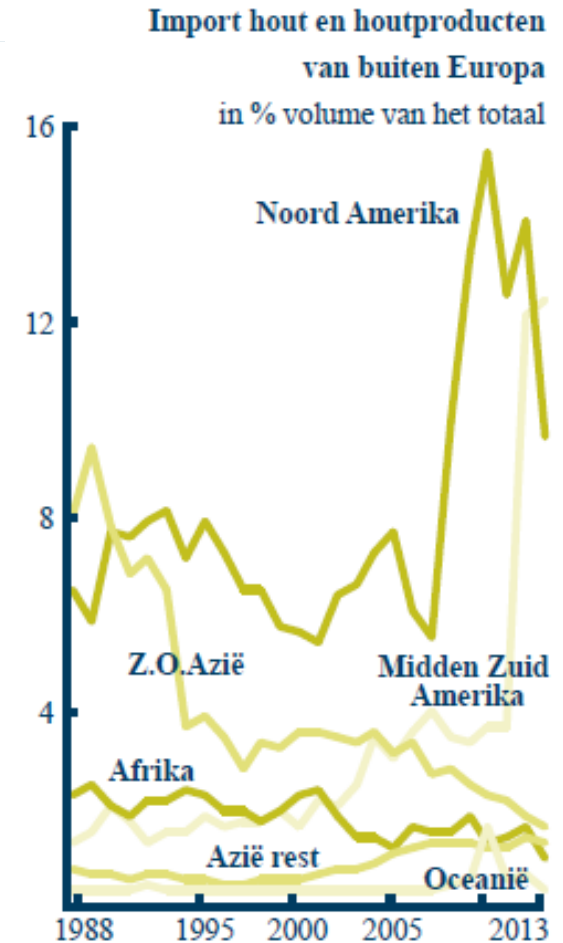
# Speulderbos, Netherlands



# Two aspects to characterise the sector



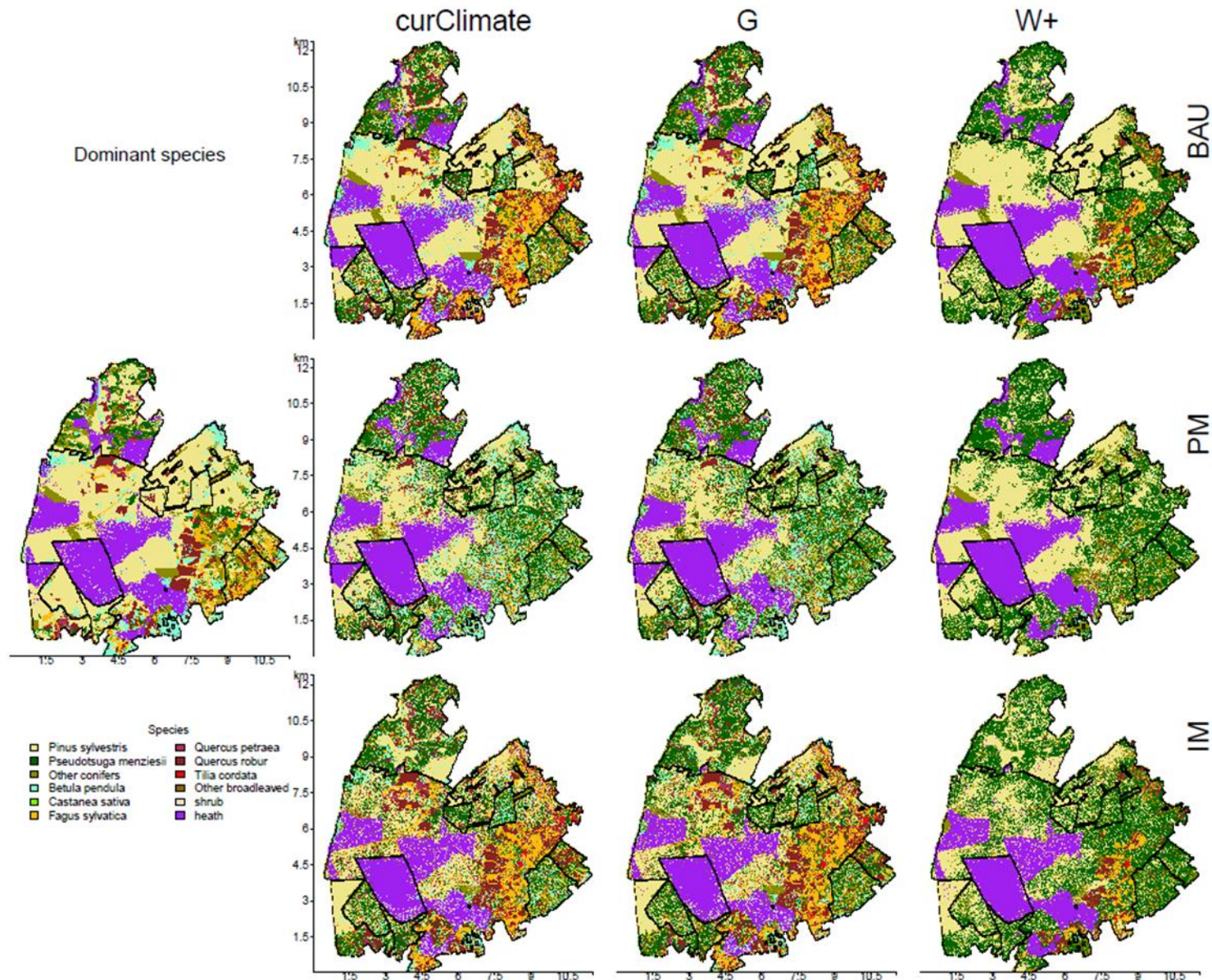
Net return per ha (private owners)



Import and export oriented sector  
(gross import 24 million m<sup>3</sup> req)  
(Probos 2014)



# Southeast Veluwe tree species after 100 years



Motive project.  
Hengeveld et al. 2015.

# Dutch forest management under climate change

- Climate scenarios are not very extreme
  - Winters warmer and wetter
  - Growing season longer
  - Summers warmer but uncertain whether they will be drier or wetter
- 
- No clear signals of climate change impacts; no extreme events
  - Climate change is not in the mind of forest owners
  - Other more direct worries: net return, biomass production, biodiversity decline.
  - Mitigation received some attention, but now mostly biomass production and bioeconomy

# Summarising

- Climate change has not been mainstreamed in Dutch forest management
- Ongoing nature conservation measures are thought to be in line with adaptive management
- Outreach of research results happens on ad hoc basis



Thank you !

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