

Potential of EU forests in achieving climate targets as well as bio-economy targets

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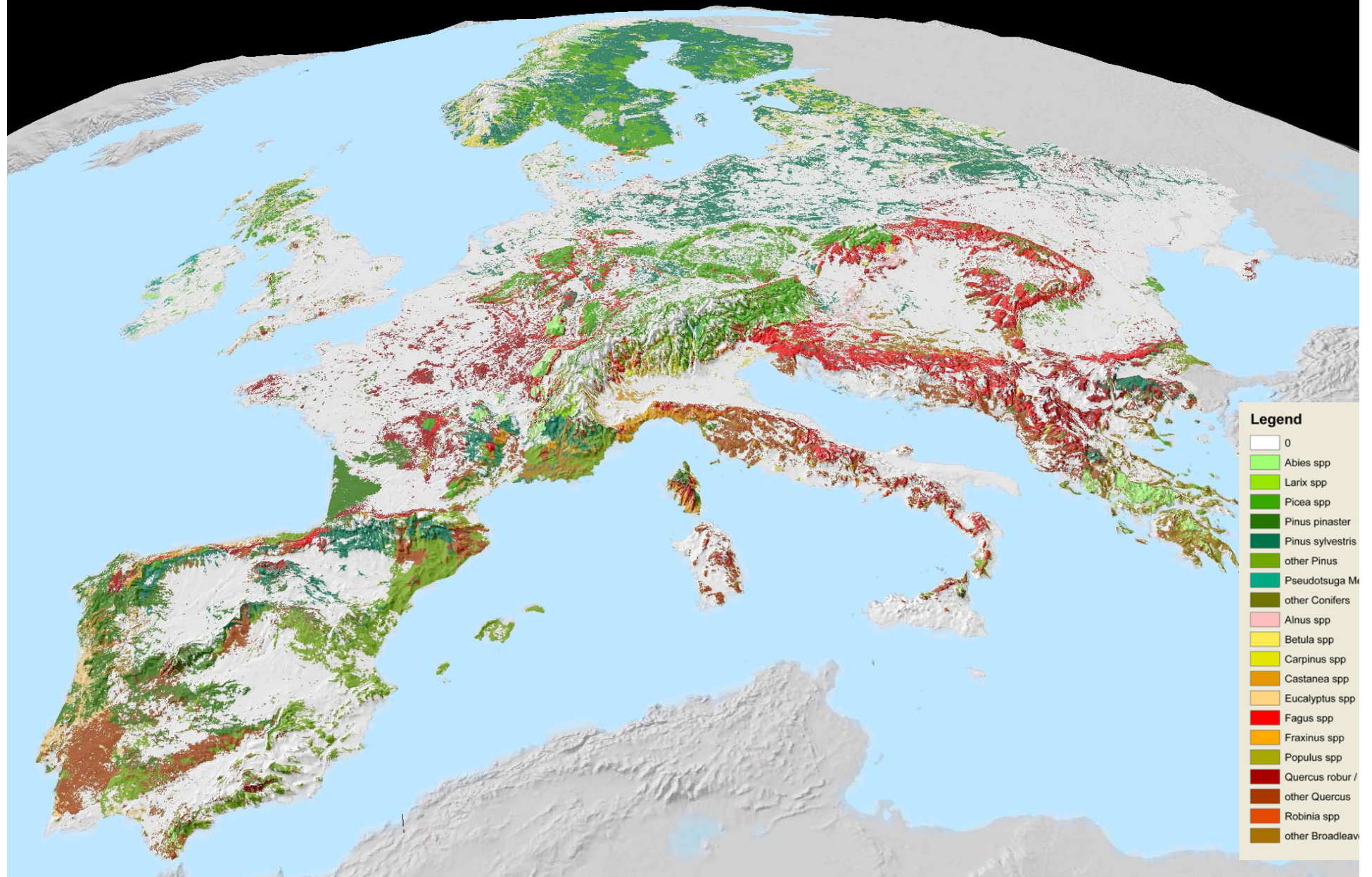


1. European forests short intro
2. Role in CO₂ sink
3. Bio-economy

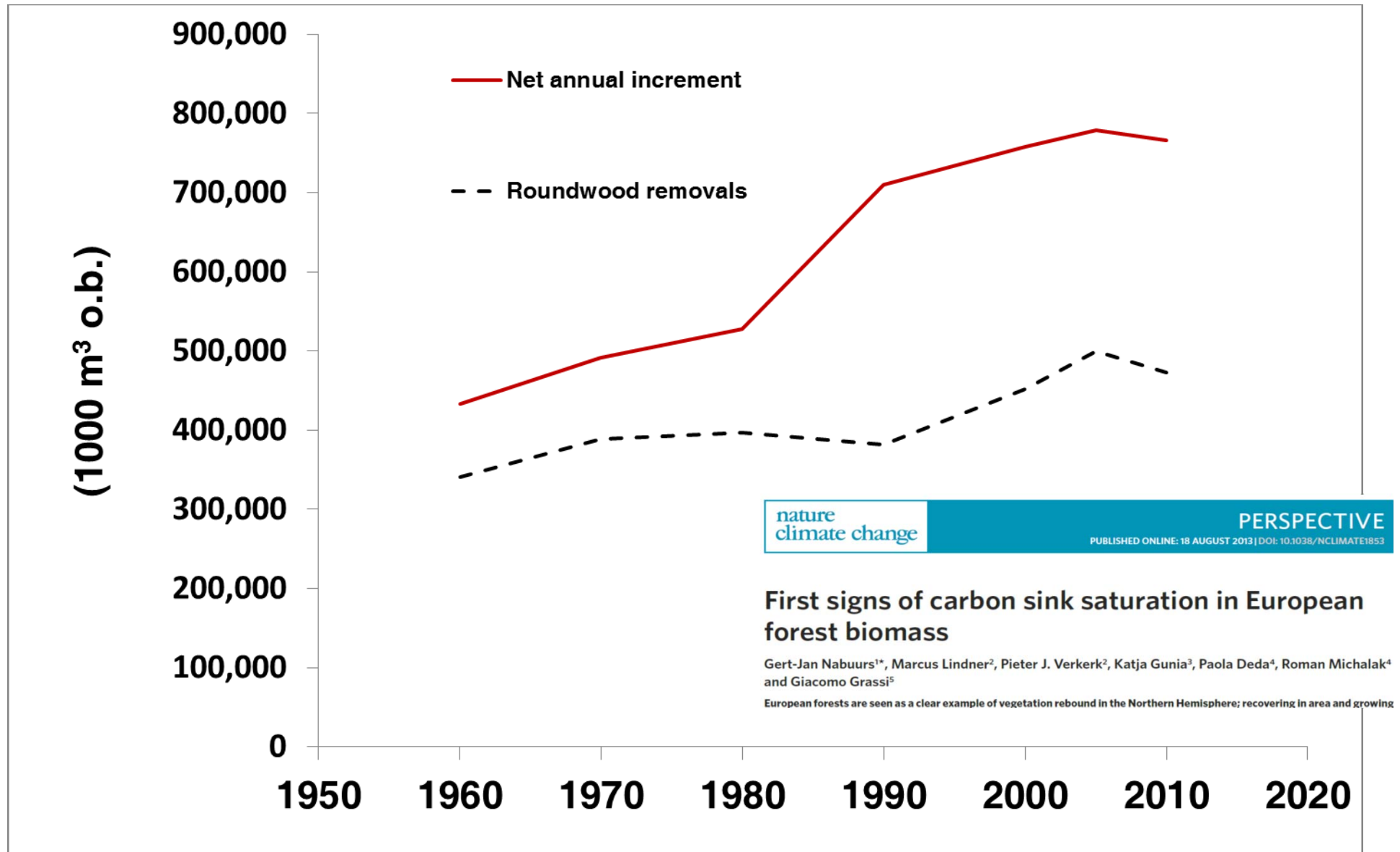


European forests, 1x1 km, tree species map

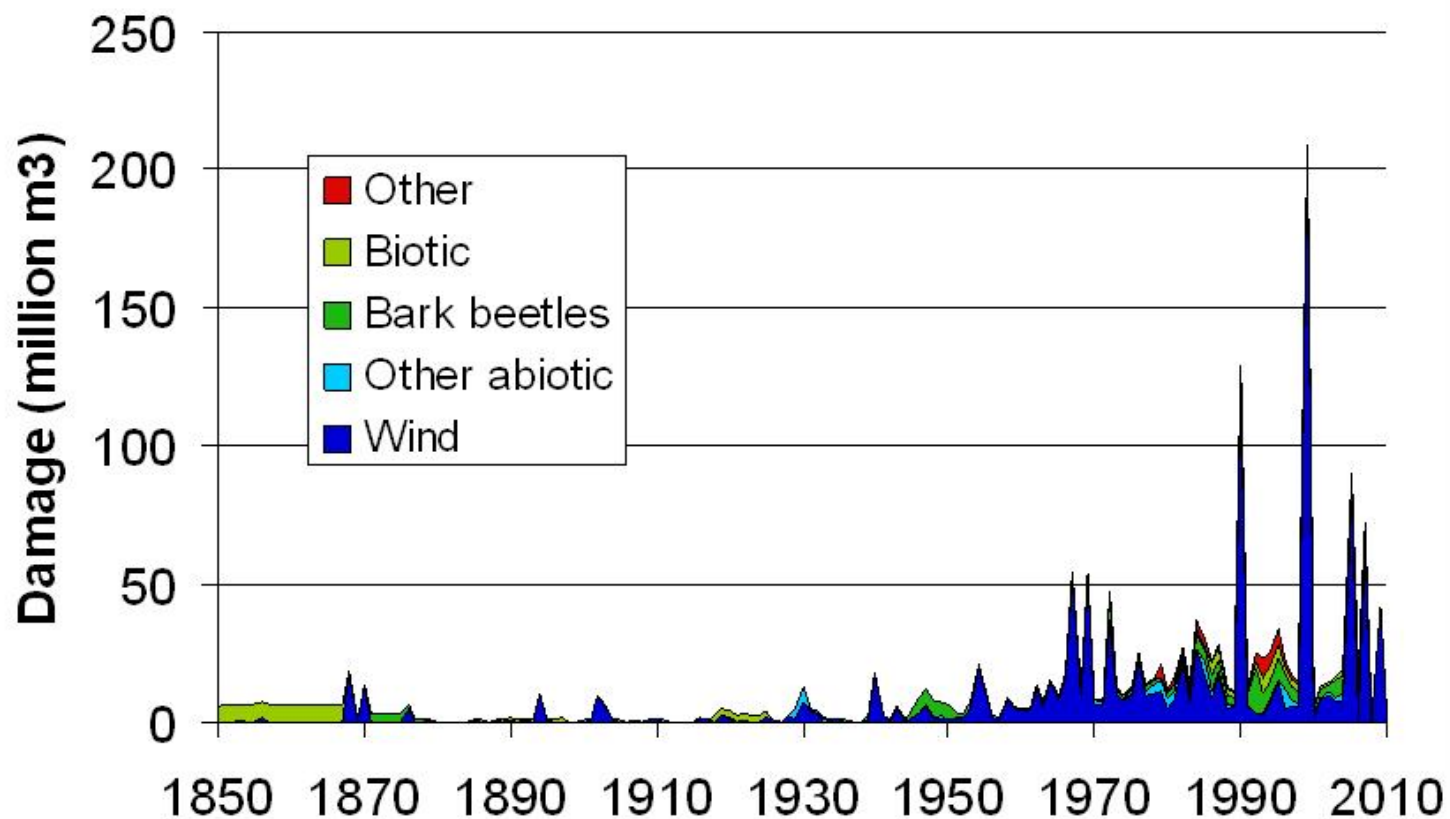
(Brus, Hengeveld, Heidema, Nabuurs, Gunia 2011)



Growth & harvest at European scale

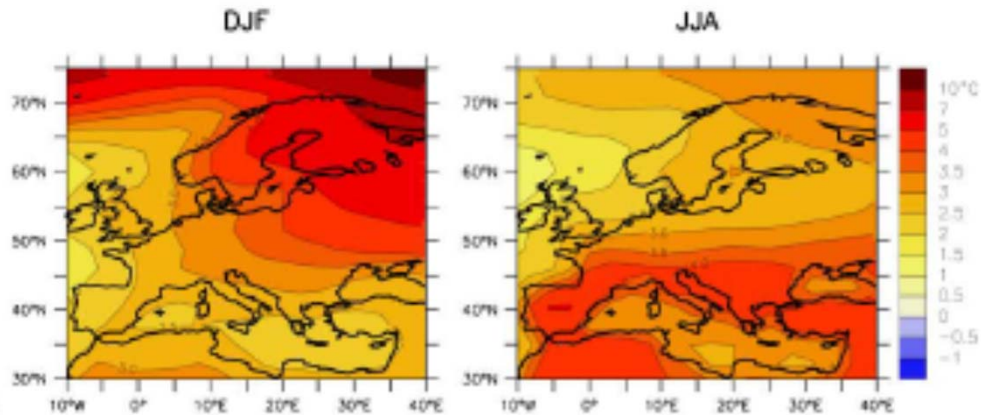


Ever higher growing stocks lead to increased disturbances



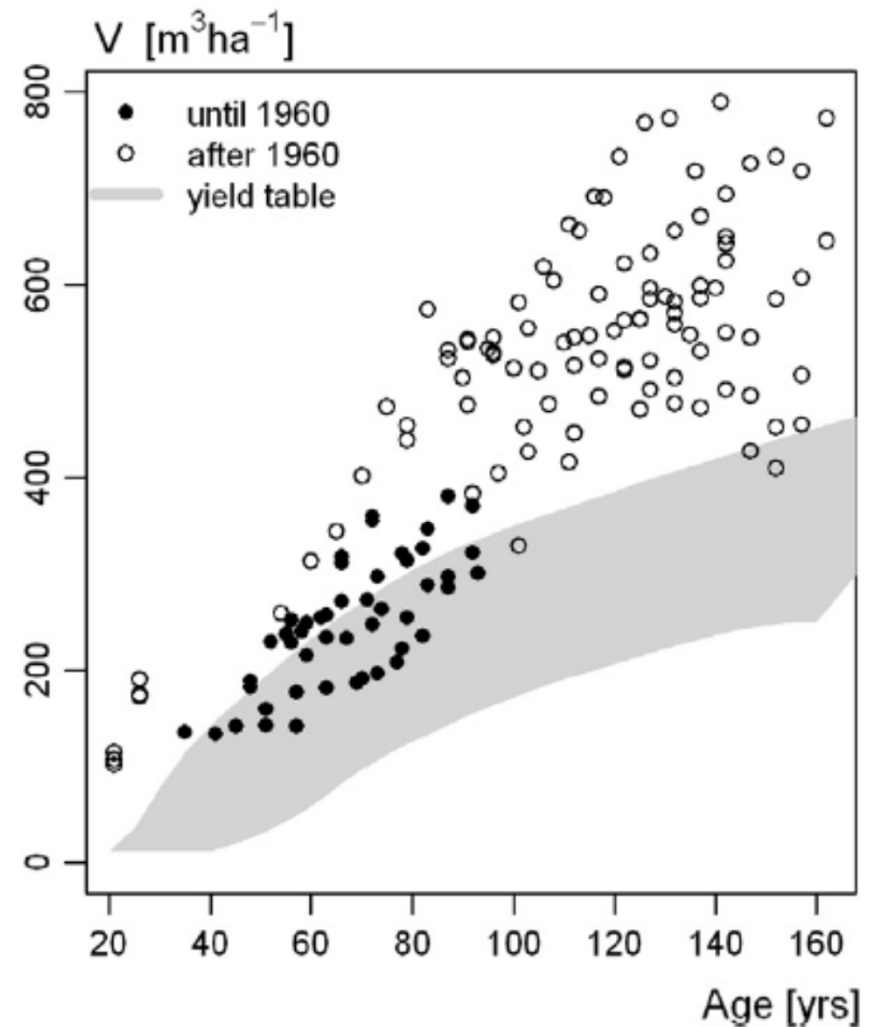
**Volume of
damage
(Schelhaas
et al 2003)**

Environmental changes



temperature change
(A1B scenario in 2090)

Oak stand volume
Pretzsch et al. 2014



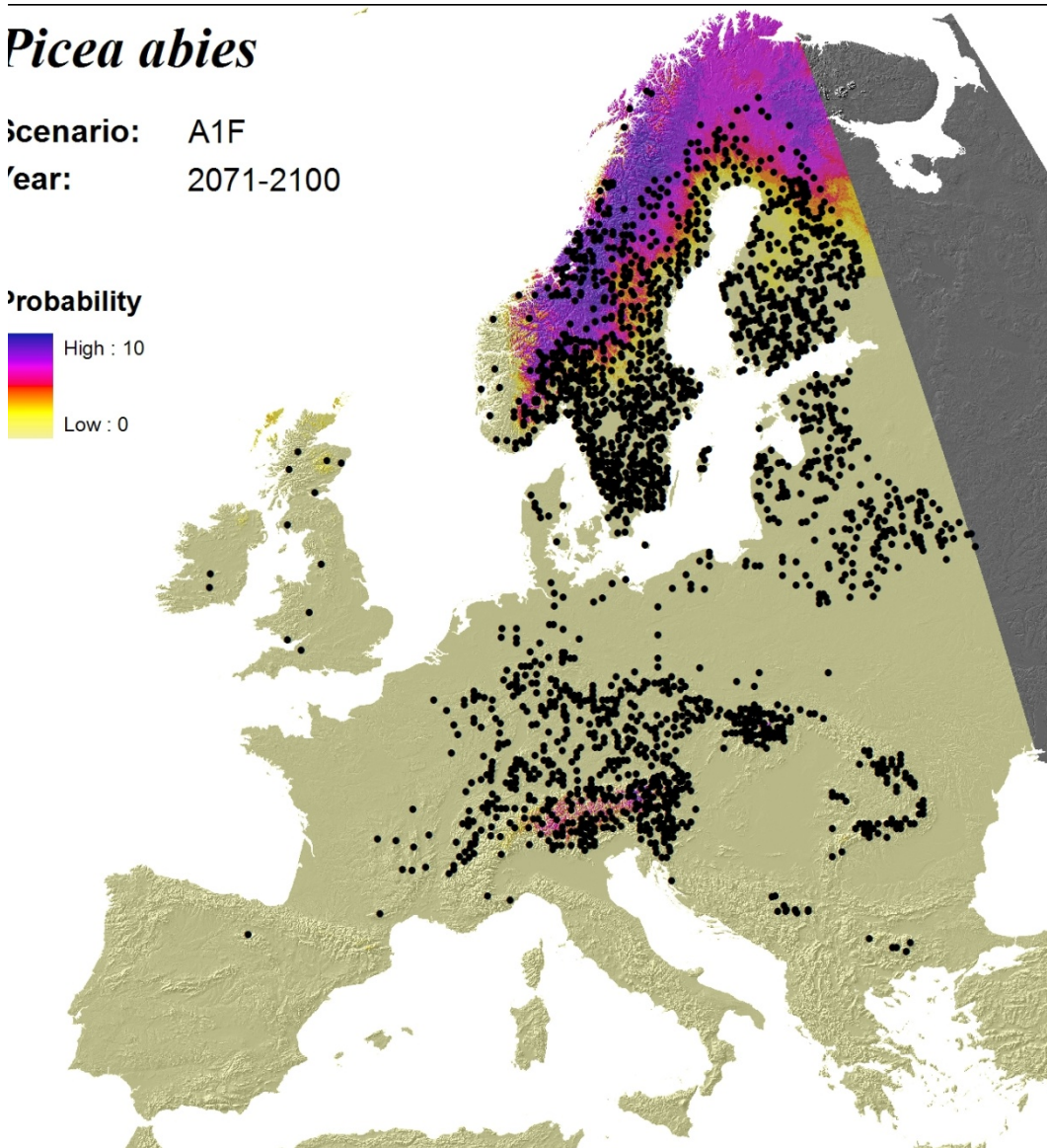
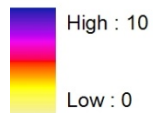
Potential future ranges

Hanewinkel et al.
2013

Picea abies

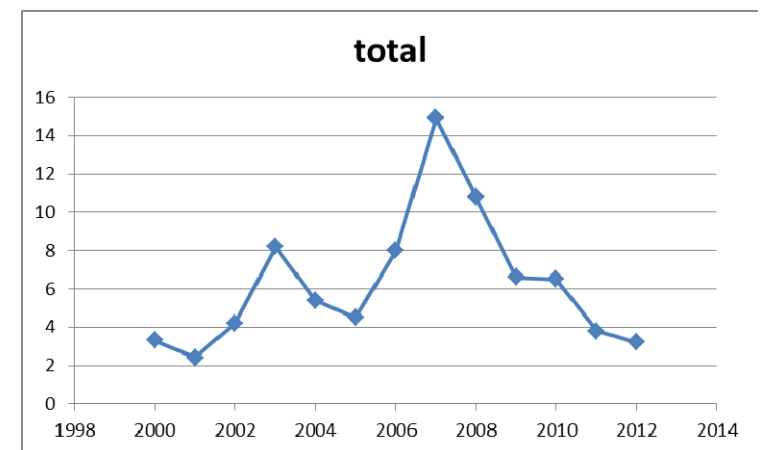
Scenario: A1F
Year: 2071-2100

Probability



Climate change is
already here!

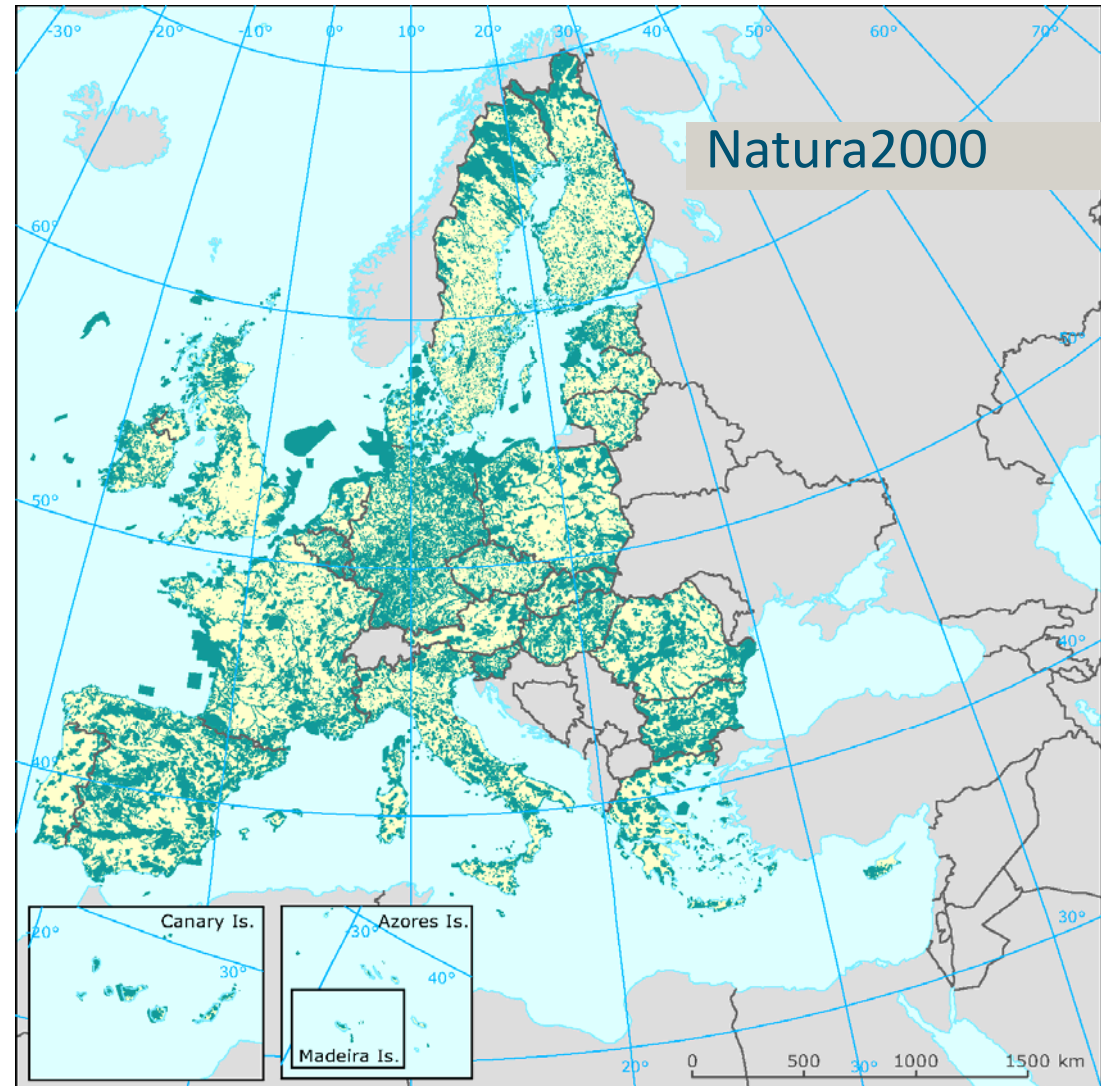
In most years,
Czech fellings of
Norway spruce
consists of 50-90%
of dead trees



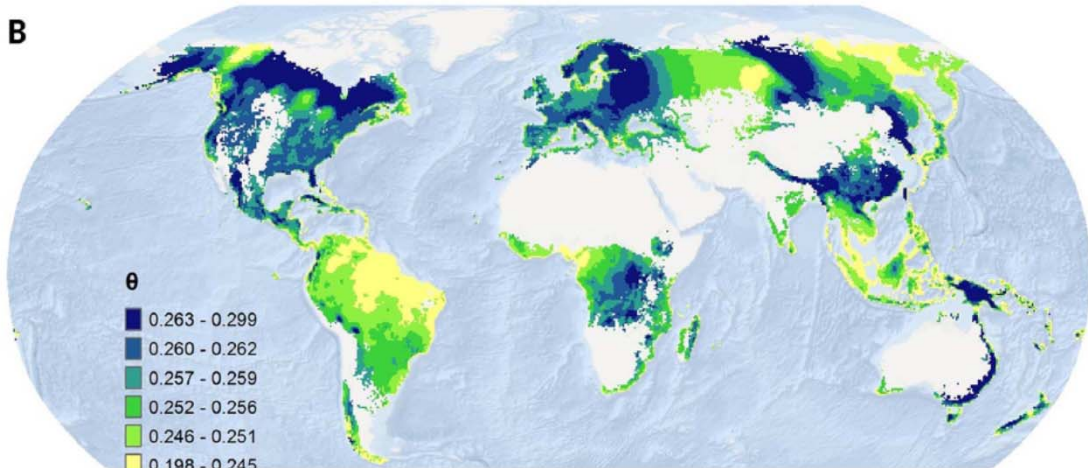
Salvage cutting Czech (Mm3)

Urbanised society asks for a different forest management

- Natura2000
- Forest management to a nature orientation
- Fragmented ownership
- Owner not dependent on forest for income



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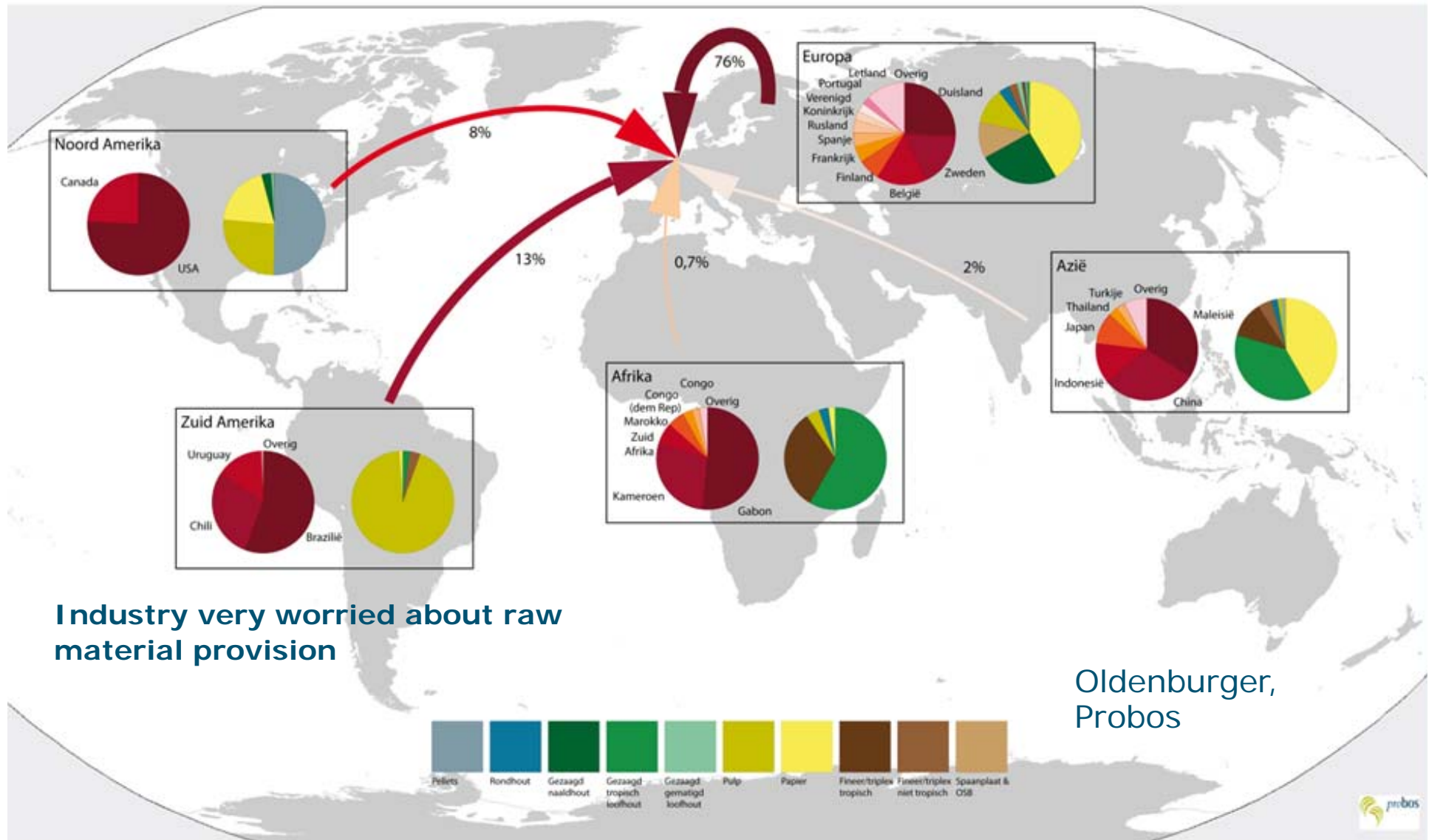
FOREST ECOLOGY

Positive biodiversity-productivity relationship predominant in global forests

in global forests

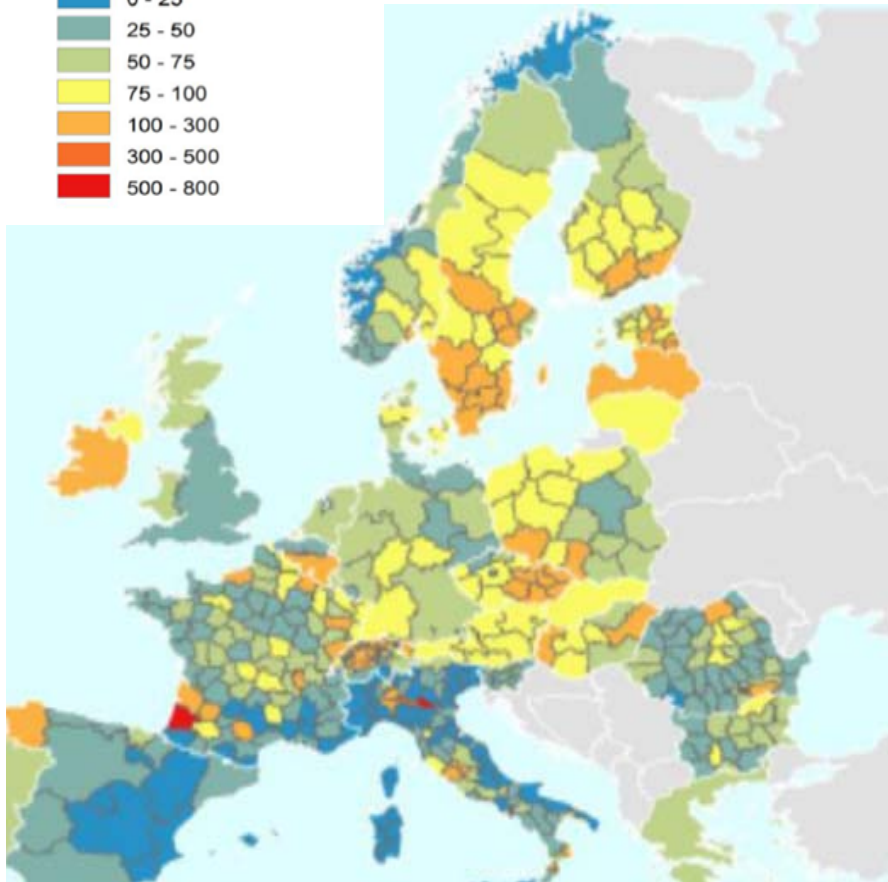
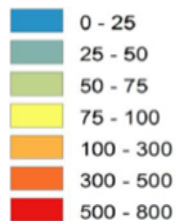
Jingjing Liang,^{1*} Thomas W. Crowther,^{2,3†} Nicolas Picard,⁴ Susan Wiser,⁵ Mo Zhou,¹ Giorgio Alberti,⁶ Ernst-Detlef Schulze,⁷ A. David McGuire,⁸ Fabio Bazzato,⁹ Hans Pretzsch,¹⁰ Sergio de-Miguel,^{11,12} Alain Paquette,¹³ Bruno Hérault,¹⁴ Michael Scherer-Lorenzen,¹⁵ Christopher B. Barrett,¹⁶ Henry B. Glick,³ Mads Scherer-Fabrizzi,¹⁷ Gert-Jan Nabuurs,^{17,18} Sebastian Pfautsch,²⁰ Geerten M. Hengeveld,^{17,18} Gert-Jan Nabuurs,^{17,18} Christian Ammer,²⁴ Peter Schall,²⁴ Helder Viana,^{21,22} Alexander C. Vibrans,²³ Christian Ammer,^{27,28} James V. Watson,¹ David Verbyla,²⁹ Nadja Tchebakova,²⁶ Markus Fischer,^{27,28} Huicui Liu,¹⁹ Han Y. H. Chen,²⁹ Xiangdong Lei,³⁰ Mart-Jan Schelhaas,³³ Eungul Lee,³⁴ Damiano Gianelle,^{31,32} Elena I. Parfenova,³⁶ Christian Salas,³³ Eungho Kim,³⁵ David A. Coomes,⁴¹ Hyun Seok Kim,^{35,36,37,38} Helge Bruelheide,^{39,40} Sylvie Gourlet-Fleury,⁴⁶ Bernhard Schmid,⁴² Susanne Brandt,^{10,31}

Europe; roughly self sufficient. But bio-economy will ask at least 250 - 500 million m3 extra.



Harvest intensity varies a lot: this is entrance to diversify across europe

Forest harvest intensity (%)



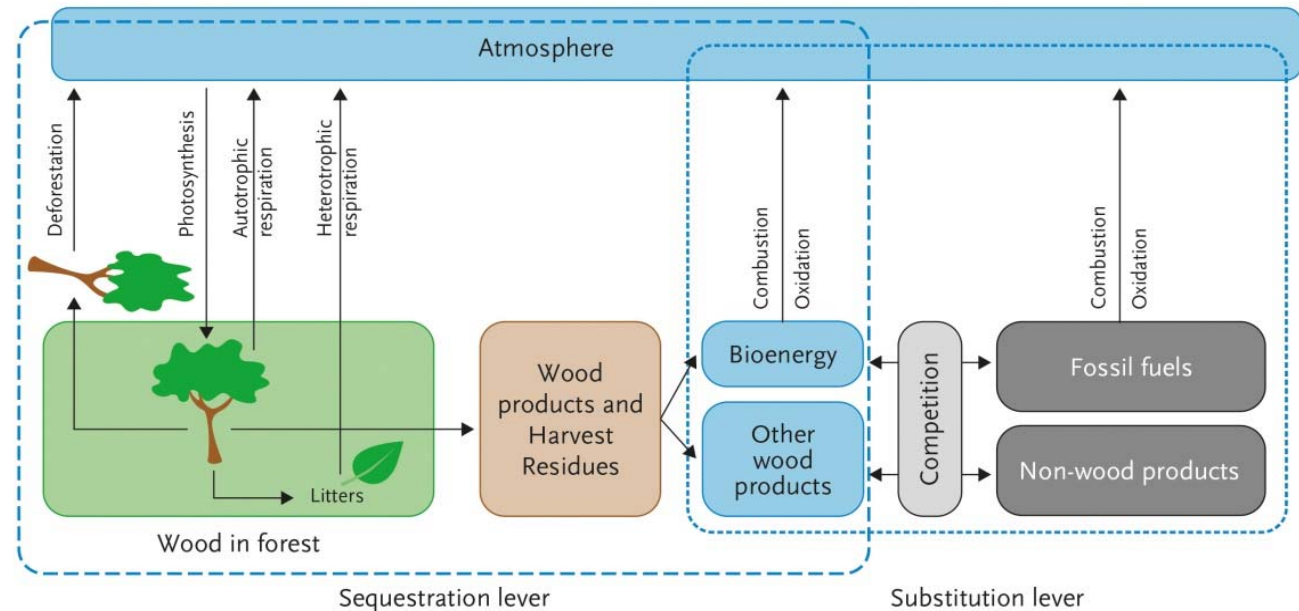
Levers et al. 2014, Verkerk 2015

- EFISCEN: Harvesting intensity as % of increment (*Levers et al. 2014*)
- *An increasing harvesting pressure in some regions, with effects on biodiversity*

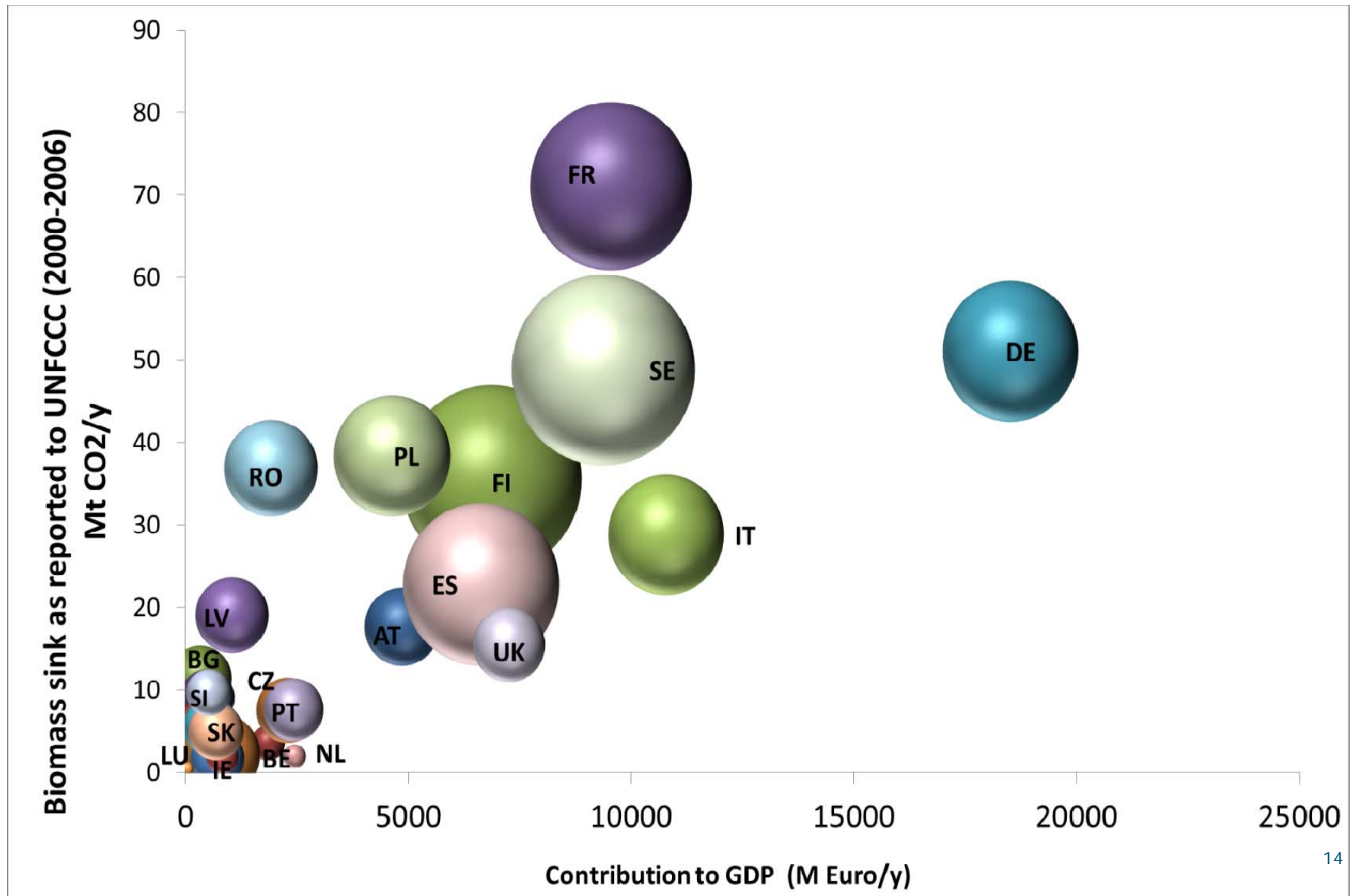
2. Role and potential in CO₂ sink

Present role of the European forest

- Sink 450 Mt CO₂, or **10%** of emissions
- Wood products sink of 44 Mt CO₂ + substituting aluminum and plastics.
- Biomass for bioenergy provides 3-4% of total EU energy need
- Signs of saturation of sink



Contribution to GDP and CO2 sink per Member State



Additional potential of Climate Smart Forestry. Forests, Hwp and energy can compensate 20% of eu emissions. New EU regulation does not recognise this

Main category of forest management measure	Sub measure	Mitigation effect (Mt CO ₂ a ⁻¹)
1. Improved forest management		170
	1a.fullgrown coppice	57
	1b. enhanced productivity & improved management	37
	1c. reduced disturbances, deforestation, drainage	35
	1d. material substitution wood products	40
2.Forest area expansion		70
3.Energy substitution		144
4. Establish forest reserves		64
Total		448

'Climate smart forestry'

- Aims at 1) sustainably increasing **forest productivity** and incomes; 2) adapting and building **resilience** to climate change; and 3) reducing and/or removing **greenhouse gas** emissions.
- Regards the whole chain
- Regionally specific measures



Climate smart forestry: regionally diverse !

- ✓ Storm prone areas: bring down the stock + invest in new wood based products, and more adapted forest
- ✓ Drained peatlands: reduce drainage
- ✓ Remote areas: strict reserves
- ✓ Former coppice: regenerate with climate adapted species
- ✓ Drought prone spruce: regenerate with adapted species



Forest with not enough regeneration

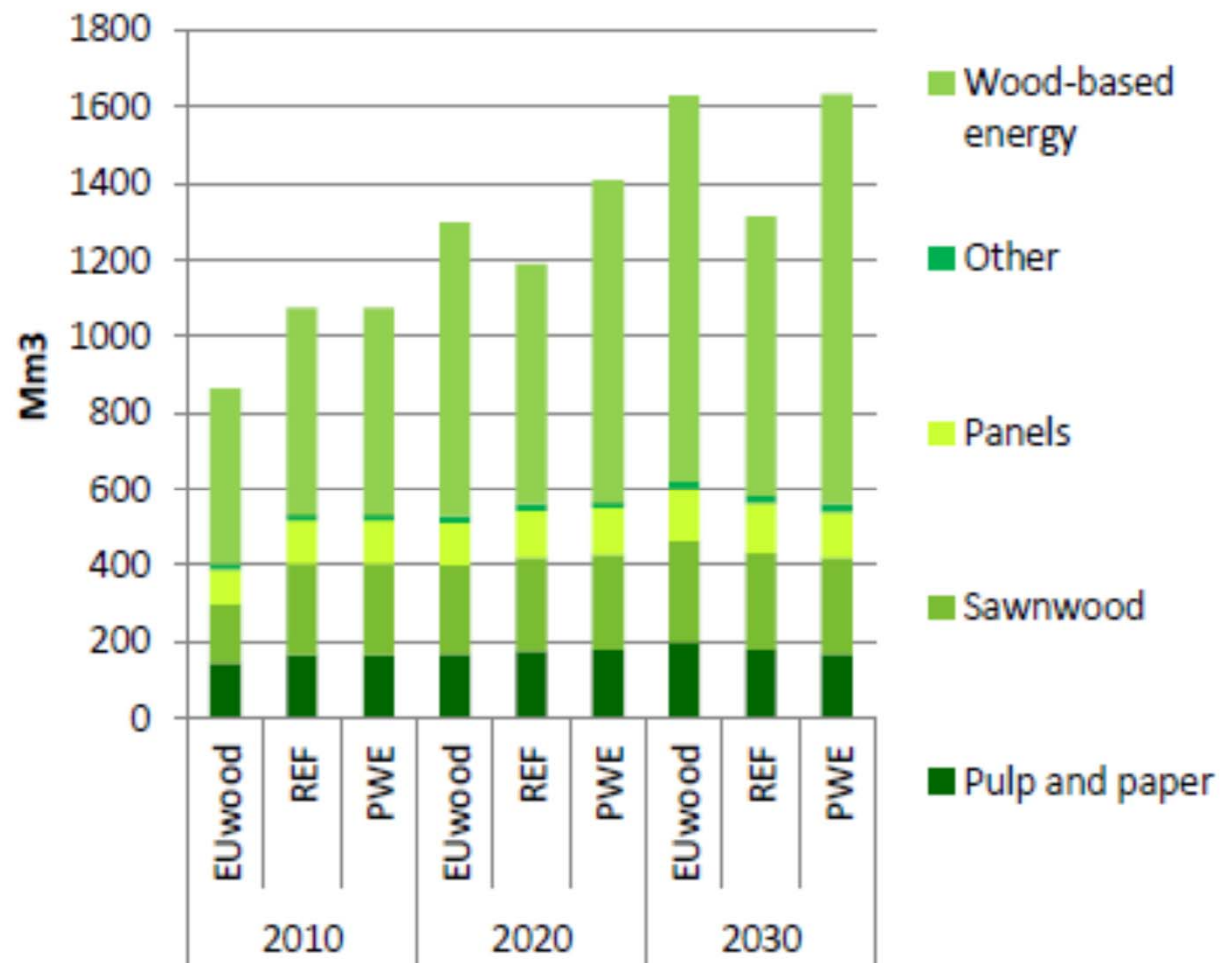
3. Bio economy

- A strategy that aims at less reliance on fossil fuels and much larger reliance on renewable sources of energy and products
- Also wood based for products and energy

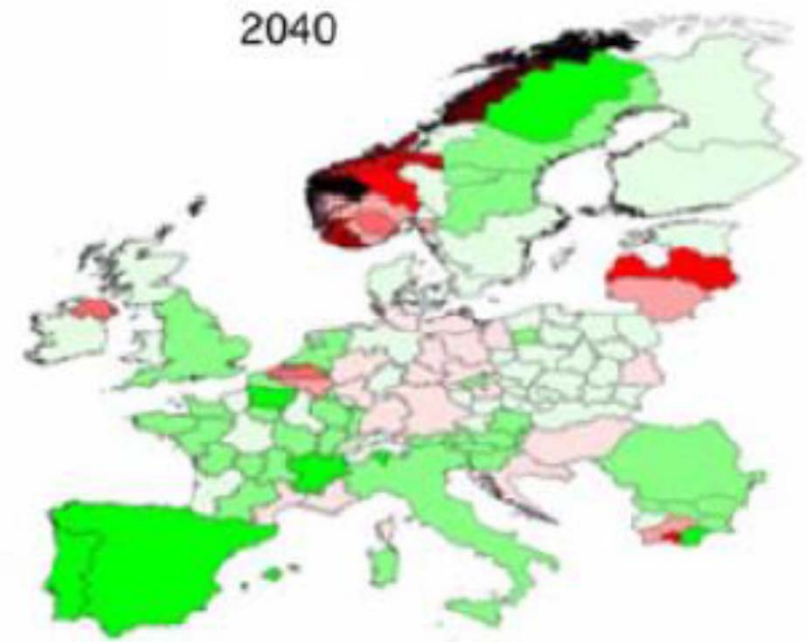
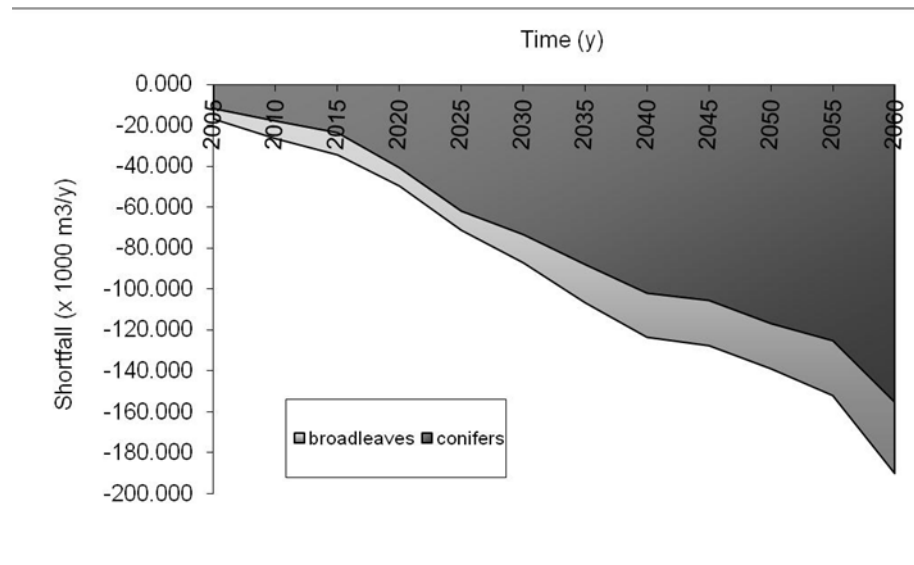


Wood demand (EFSOS & EU WOOD)

Will increase fast from current 800 million m³ to 1200-1600 million m³



EFISCEN: an additional 150 million m³ harvest is possible, but still a large shortage remains (EFISCEN)



Nabuurs et al. 2006

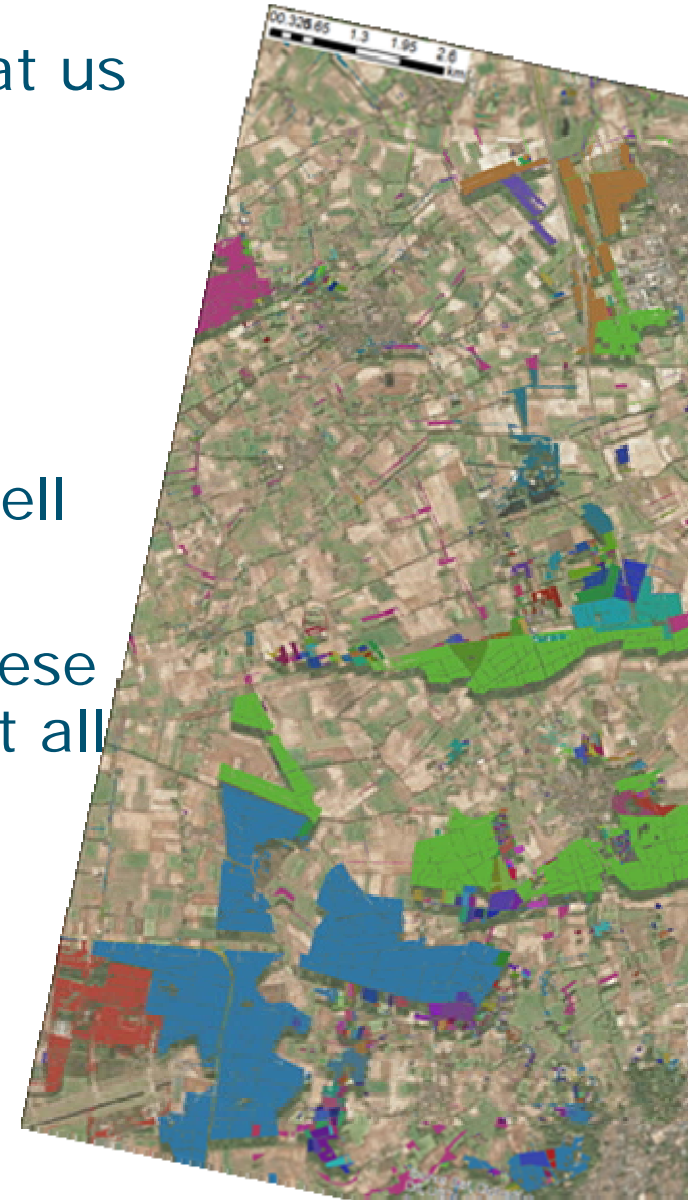
Concluding

Many (contrasting) challenges coming at us

Paris Accord and Bio-economy can and must be developed in coordinated way. They can strengthen each other.

CSF can both strengthen the sink, as well as provide raw materials

National plans for implementation of these policies are needed. Taking into account all functions of the forest



Thank you !

Thanks to all NFIs

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