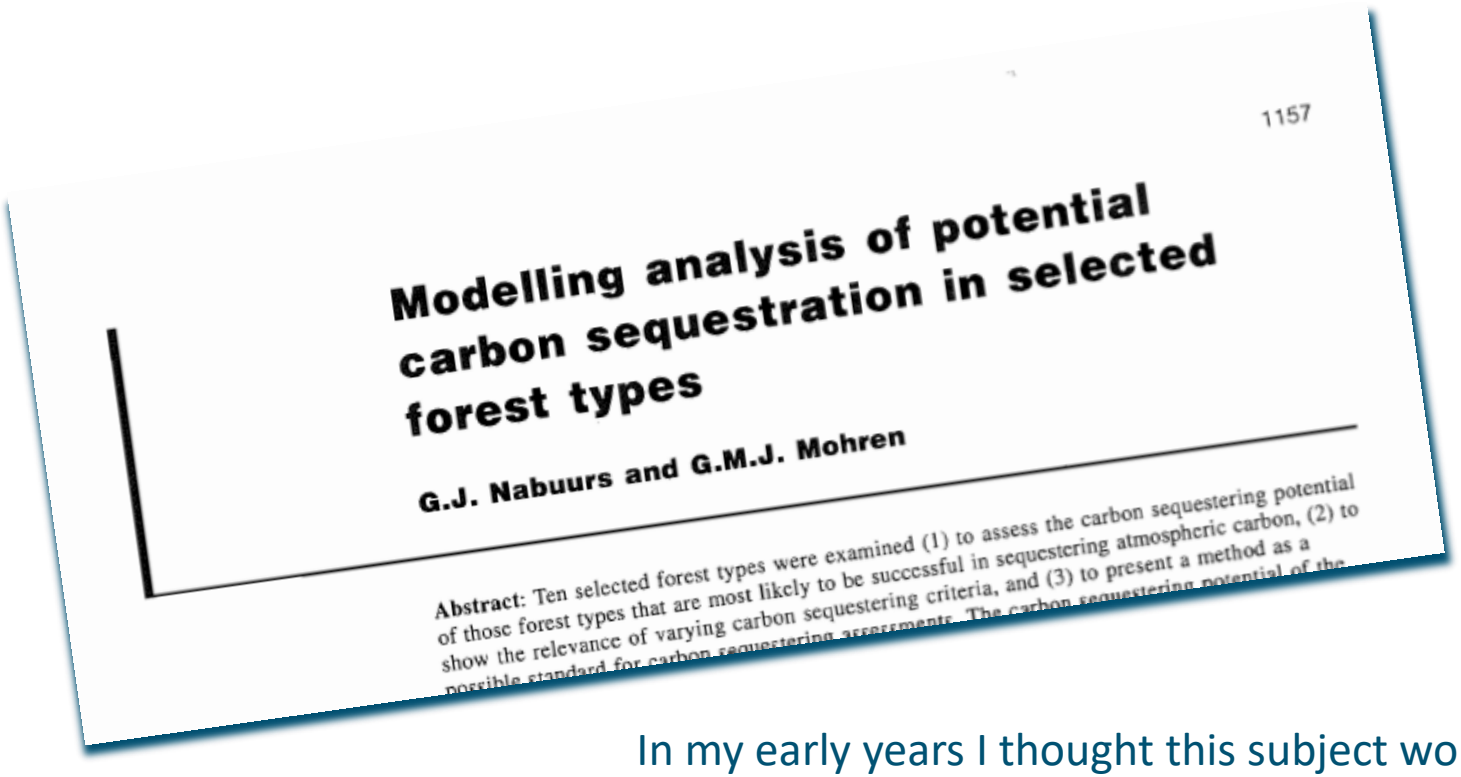
The role of Nature Based Solutions in the energy transition and pathways towards net zero – the role of forests

Professor Gert-Jan Nabuurs

5 June 2020

IIGCC webinar

We have 25 years of experience with forest carbon modelling



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Modelling analysis of potential carbon sequestration in selected forest types

G.J. Nabuurs and G.M.J. Mohren

Abstract: Ten selected forest types were examined (1) to assess the carbon sequestering potential of those forest types that are most likely to be successful in sequestering atmospheric carbon, (2) to show the relevance of varying carbon sequestering criteria, and (3) to present a method as a possible standard for carbon sequestering assessments. The carbon sequestering potential of the

In my early years I thought this subject would fade away quickly....

Canadian Journal of Forest Research. 25: 1157-1172. (1995)
used in IPCC second assessment report

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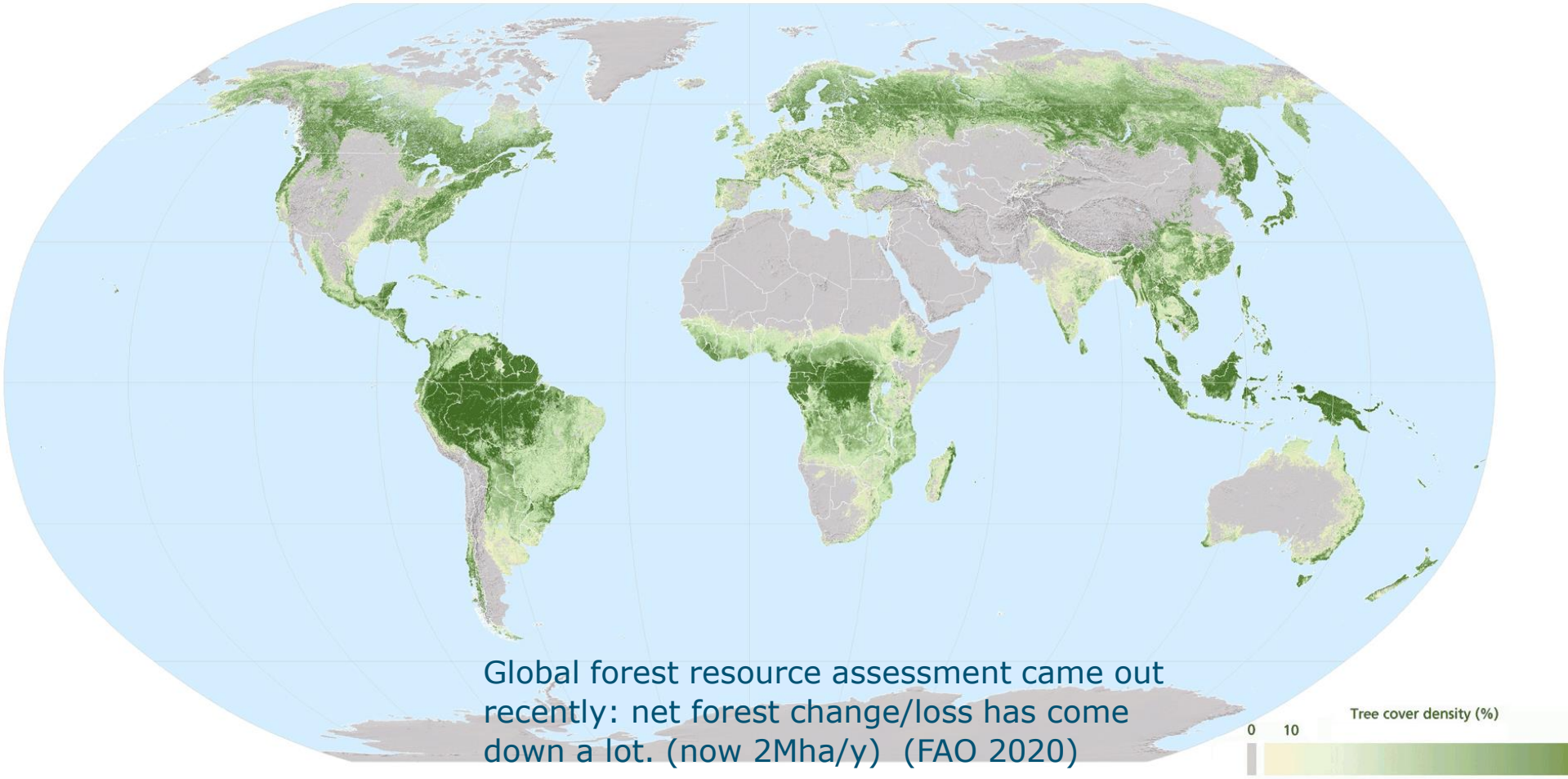
Role of global forests

- https://www.youtube.com/watch?v=x1SgmFa0r04

This role is clearly recognised

...but can we strengthen this role as part of whole societal transition ?

~4 billion ha forest with more and diverse demands on them. *Soon we will be 9 billion people*



Global forest resource assessment came out recently: net forest change/loss has come down a lot. (now 2Mha/y) (FAO 2020)

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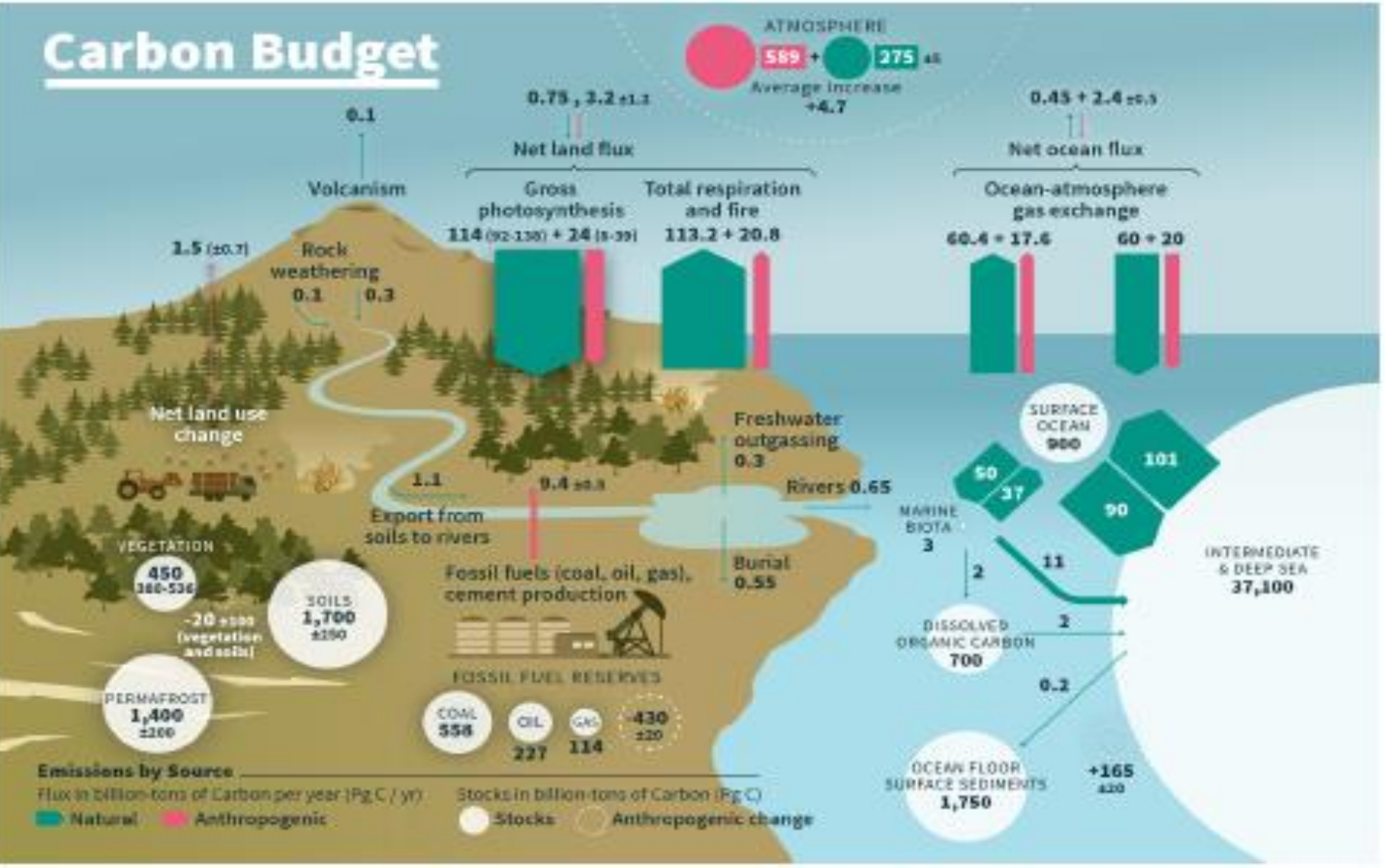
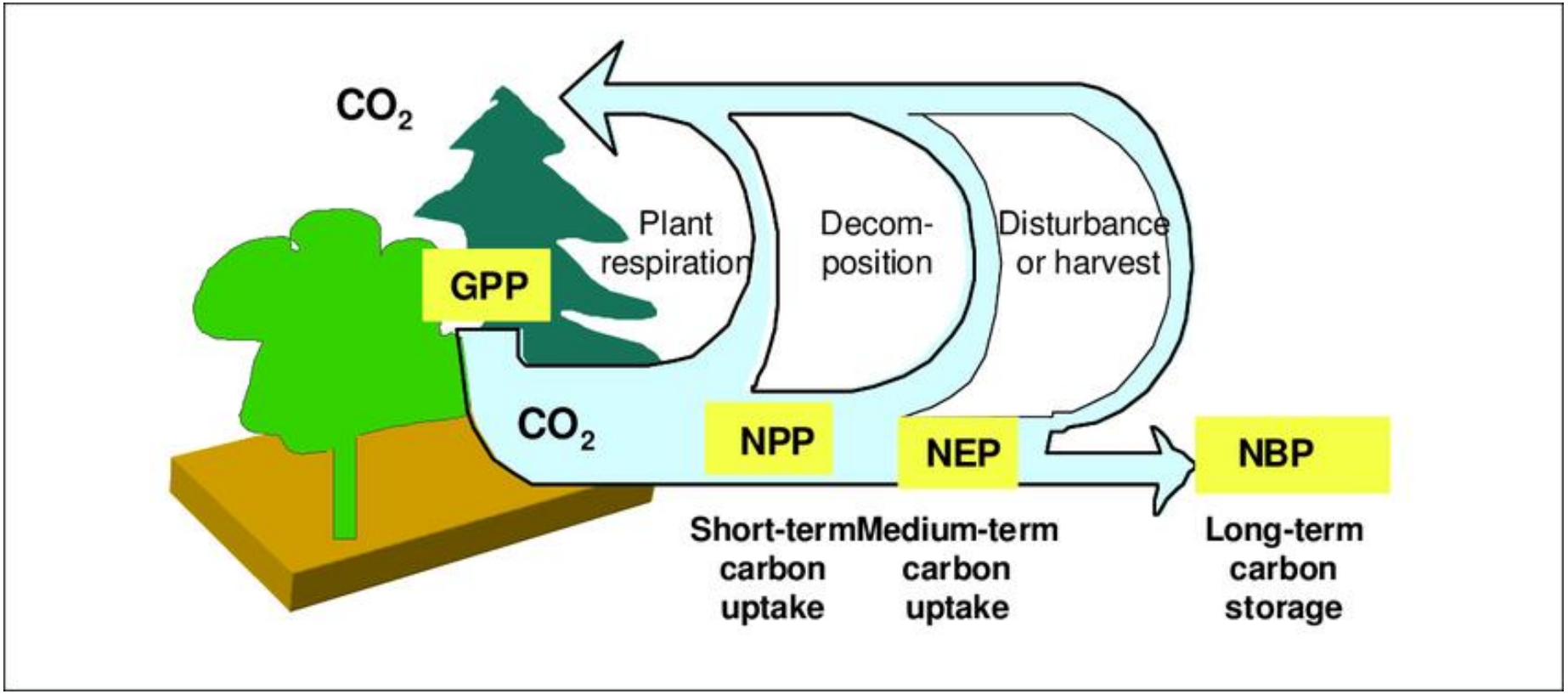
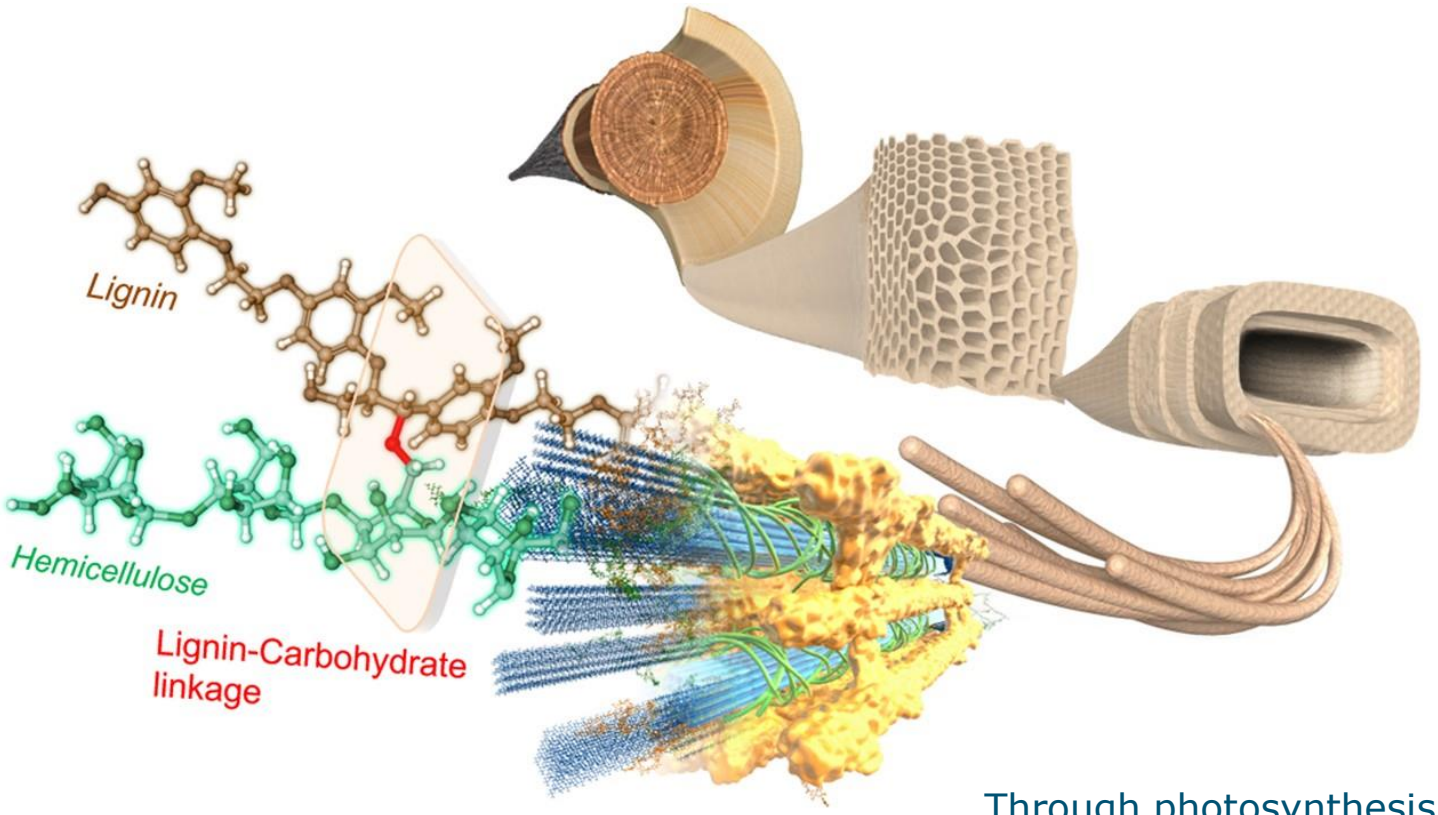
Biospheric carbon budget: gross fluxes are large, net exchange small (IPCC 2019)



Gross uptake and losses are very large



Where does the carbon go?



Through photosynthesis the CO2 is taken up and transformed into long carbon chains. (Lignin & cellulose). After a forest cut, most of the carbon is still in the wood.

The total amount of carbon in the world does not change

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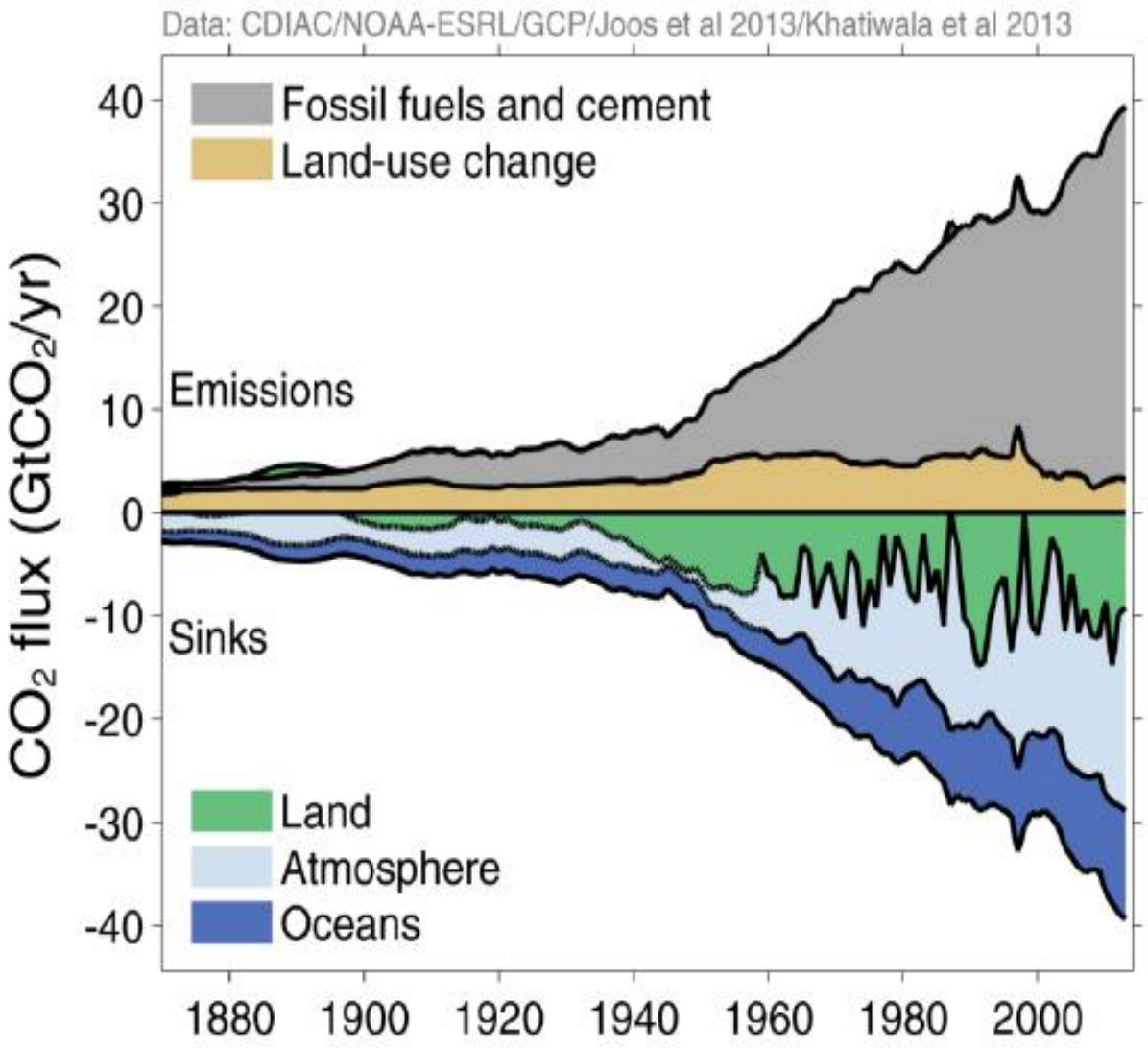
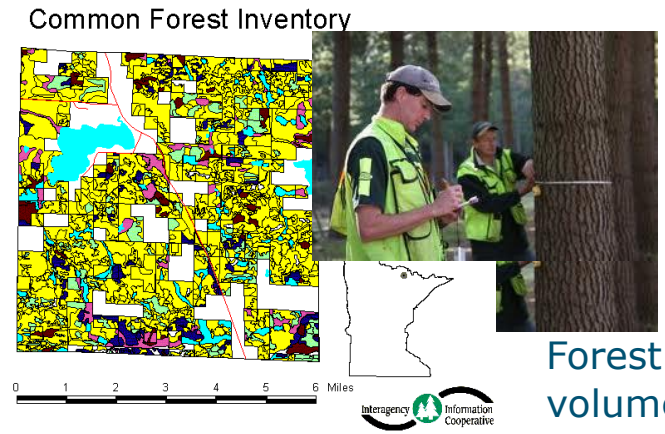
Uncertainty: annual variation.

Emissions and their partitioning

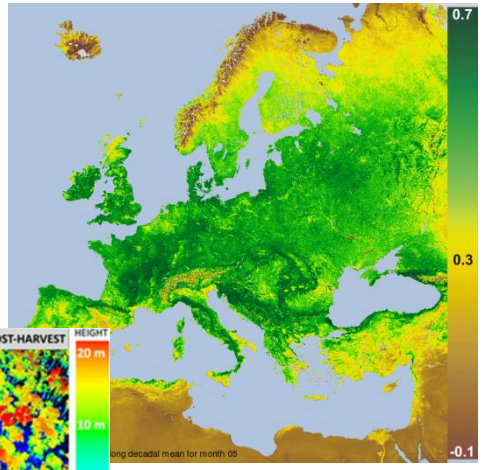


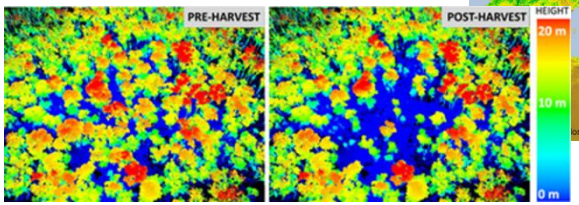
GCP 2014

Assessment methods: large uncertainty in LULUCF sector does not help



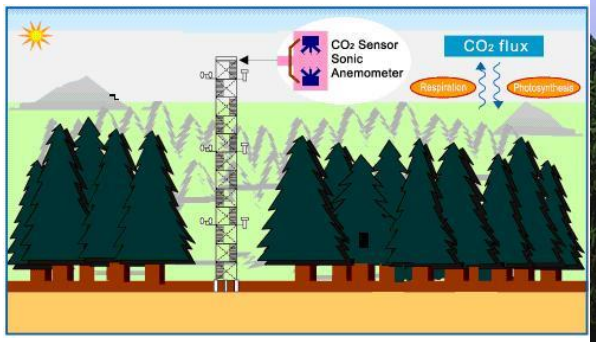
Forest inventories: Stem volumes are converted. Bookkeeping models e.g. EFISCEN, CBM, CO2FIX

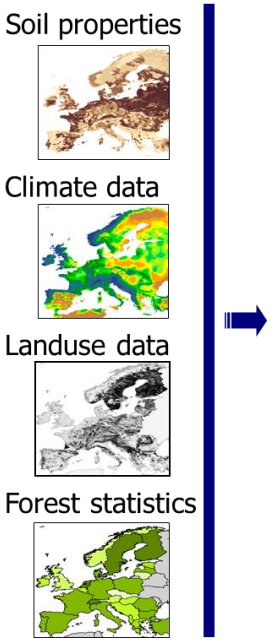




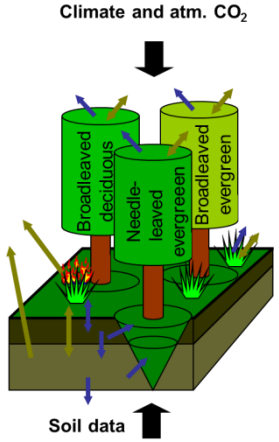
Remote sensing products & Lidar , e.g. AVHRR, MODIS, Sentinel

Eddy flux towers





LPJ Global vegetation models



And e.g. Orchidee

Yes, the resource is under pressure: Spruce mortality. Estimated > 200 million m3.

Countries realise they will need natural resources.

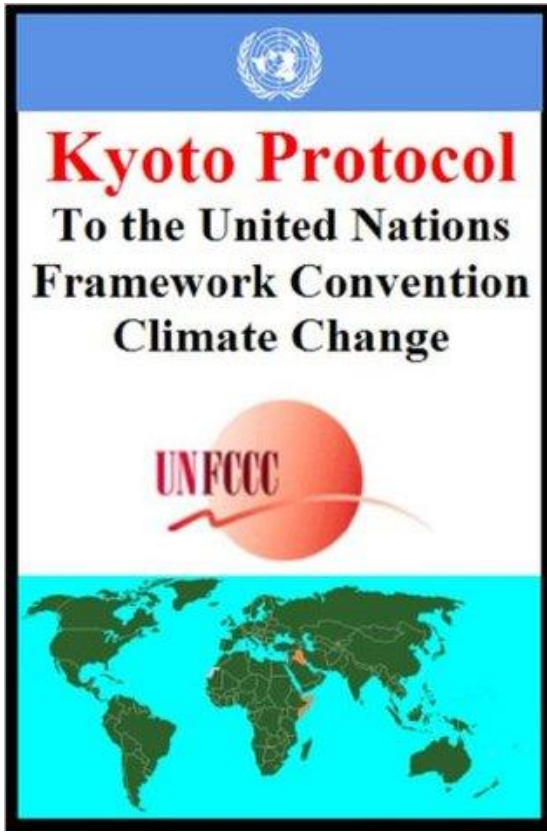
But they are also vulnerable

Nature based Solutions: IPCC 5th assessment. Addis Abeba, 2012

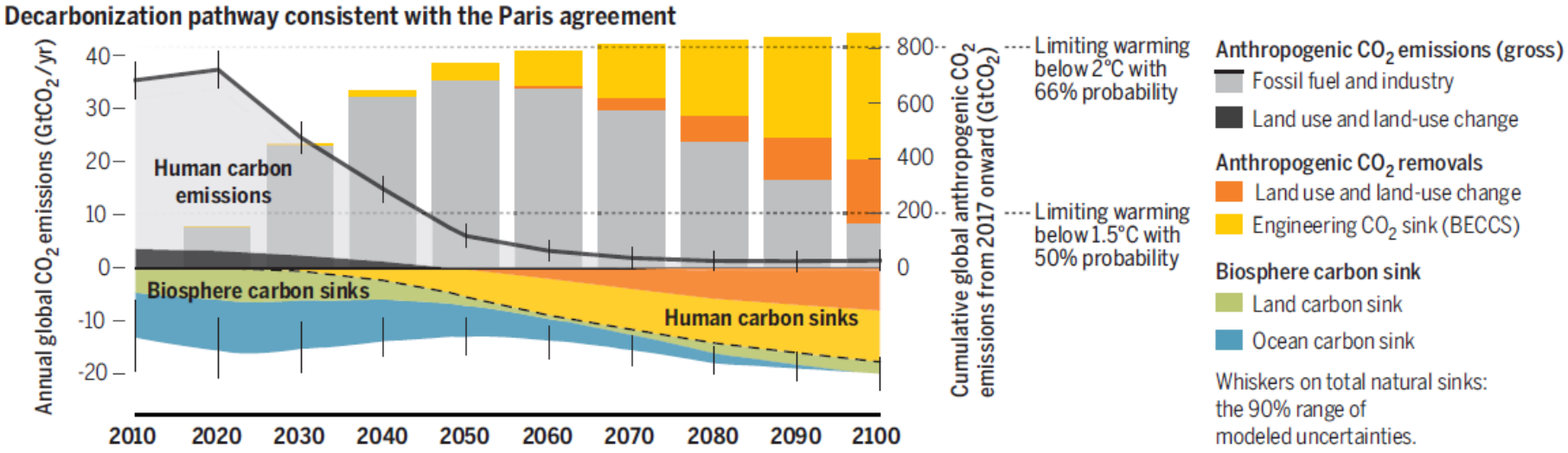
Challenge for the IPCC

- Current role of the biosphere,
- Future role under climate change,
- What can be accounted '..*direct human induced activities, limited to ..*'

..and are activities in biosphere sincere, no trade offs, are they sustained, or is it green washing??



There is no doubt that the land use sector has to be part of the overall solution



Agriculture, Forestry and Other land use is responsible for 23% out of total global emissions of 58Gt CO2/y in 2018 (=13Gt CO2e)
Natural sink is taking up 11 Gt CO2e (GCP 2019)

Rockstrom et al. 2017

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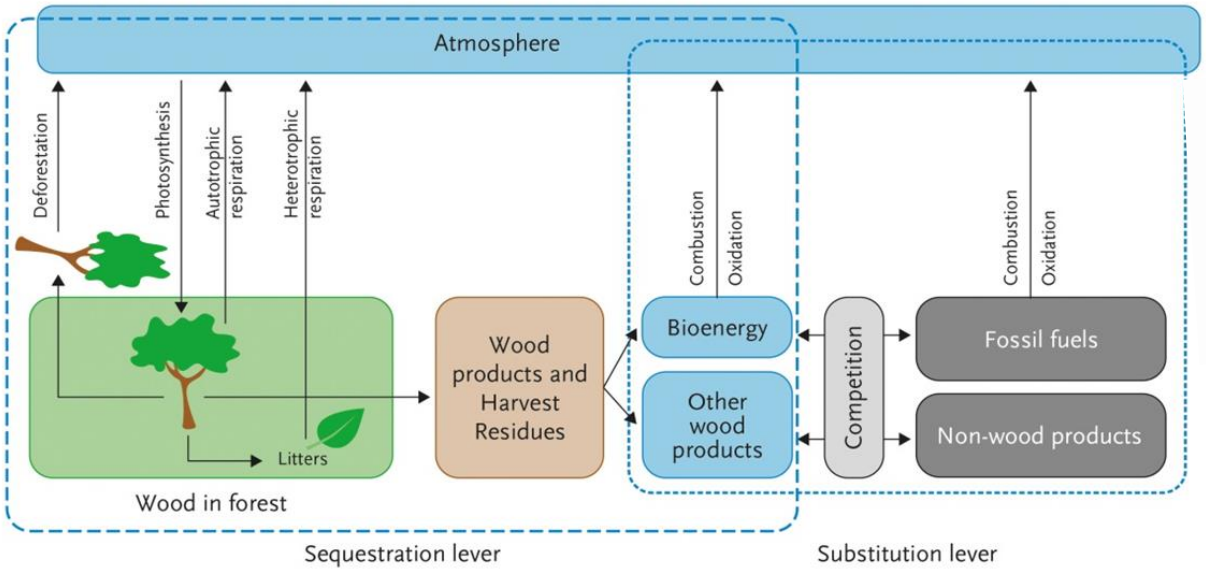
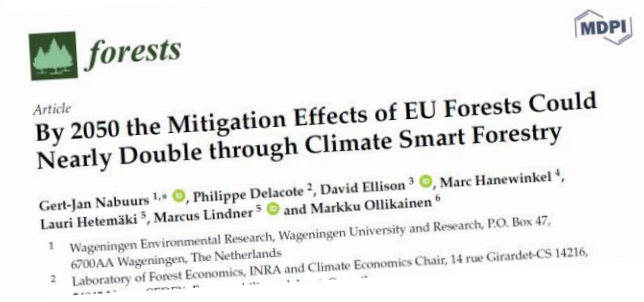
E.g. EU : Climate mitigation:
- can climate smart forestry help?

European forests currently mitigate 11-13% of total European emissions

Through a set of measures this can almost be doubled. We assessed with our European forest modelling tools




forests

MDPI

Article

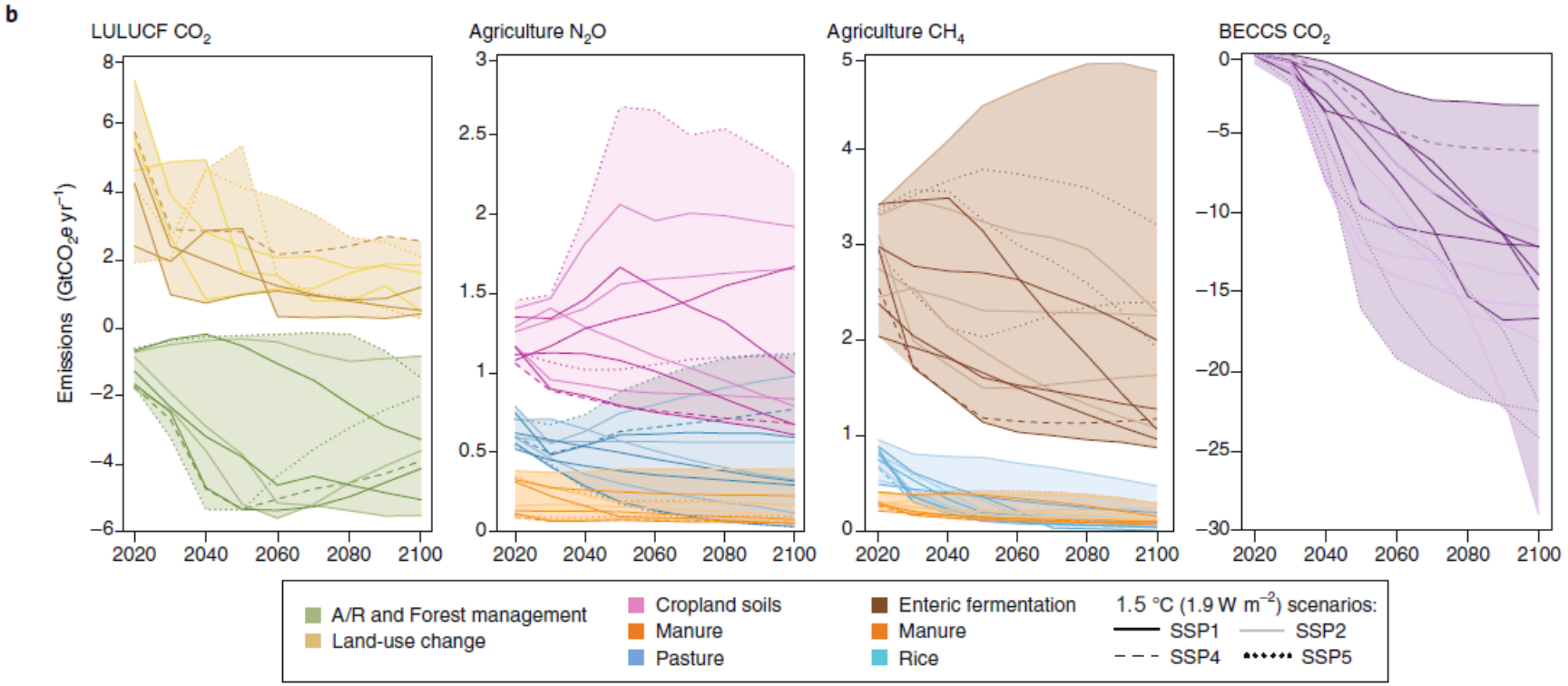
By 2050 the Mitigation Effects of EU Forests Could Nearly Double through Climate Smart Forestry

Gert-Jan Nabuurs [1,*], Philippe Delacote [2], David Ellison [3], Marc Hanewinkel [4], Lauri Hetemäki [5], Marcus Lindner [5] and Markku Ollikainen [6]

1 Wageningen Environmental Research, Wageningen University and Research, P.O. Box 47, 6700AA Wageningen, The Netherlands
2 Laboratory of Forest Economics, INRA and Climate Economics Chair, 14 rue Girardet-CS 14216,

LULUCF: Land Use, Land Use Change and Forestry

Contribution of land sector



22 measures analysed by region: stopping deforestation, stopping degradation, rewetting, forest management, improve agriculture, etc.

nature climate change
REVIEW ARTICLE
https://doi.org/10.1038/s41558-019-0591-9

Contribution of the land sector to a 1.5 °C world

Stephanie Roe[1,2*], Charlotte Streck[2], Michael Obersteiner[3], Stefan Frank[3], Bronson Griscom[4], Laurent Drouet[5], Oliver Fricko[3], Mykola Gusti[3], Nancy Harris[6], Tomoko Hasegawa[7], Zeke Hausfather[8], Petr Havlík[3], Jo House[9], Gert-Jan Nabuurs[10,11], Alexander Popp[12], María José Sanz Sánchez[13], Jonathan Sanderman[14], Pete Smith[15], Elke Stehfest[16] and Deborah Lawrence[1]

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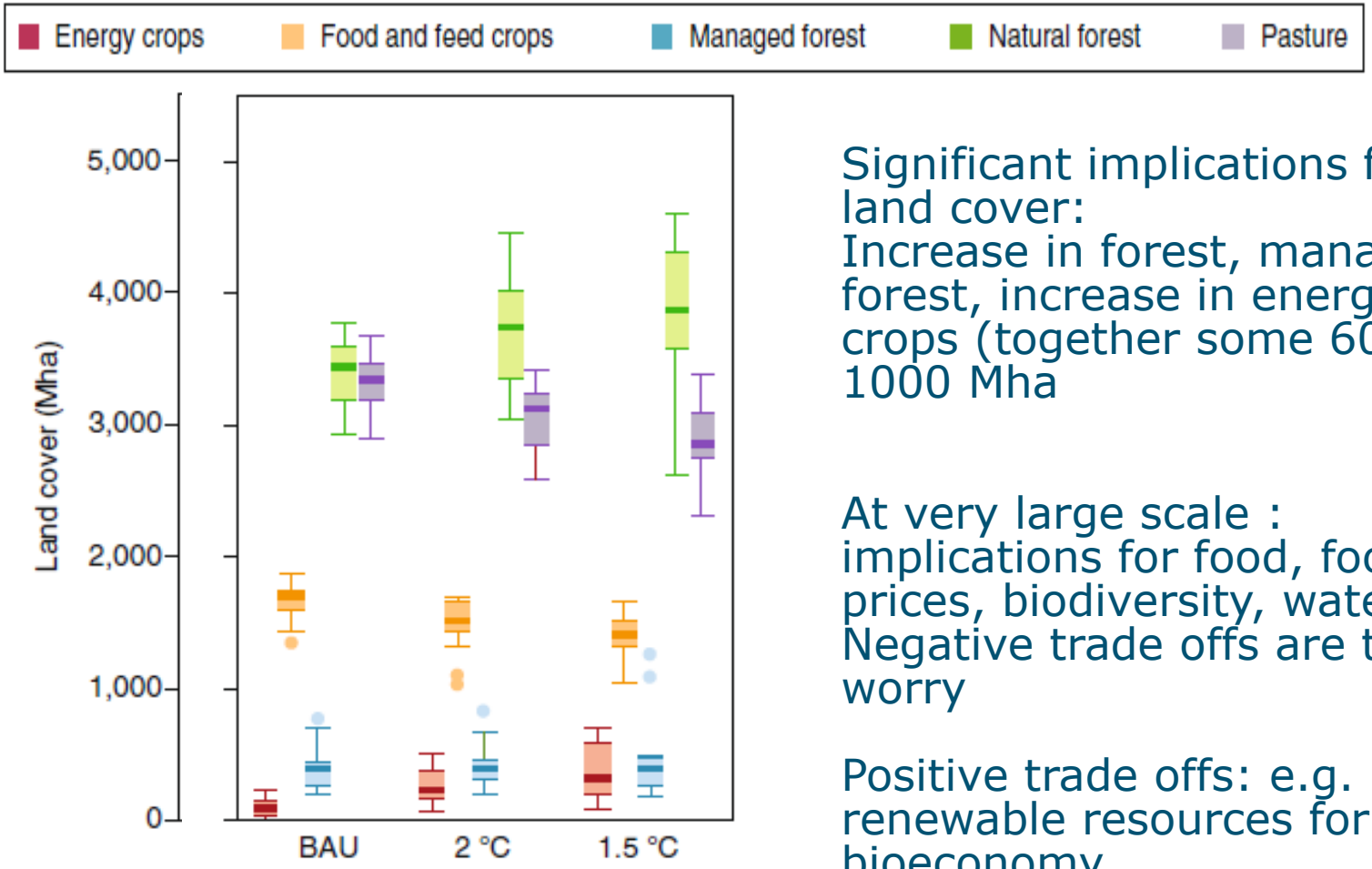
Land cover balance (Roe et al.)



Significant implications for land cover:
Increase in forest, managed forest, increase in energy crops (together some 600-1000 Mha

At very large scale : implications for food, food prices, biodiversity, water, etc. Negative trade offs are the worry

Positive trade offs: e.g. renewable resources for a bioeconomy.

Why has not much happened so far

- Kyoto Protocol had a very small emission reduction target (~-5%).
- Monitoring and reporting protocols not available, but are available now. Reporting has improved a lot
- High uncertainty in land use sector, but also now much lower
- Perceived losses of carbon again
- No carbon credits market

What needs to be done to scale investments

- Set targets in land use sector
- Voluntary carbon market needs to evolve into mature carbon market for land use sector
- Agreed standards and methods for reporting, partly remote sensing based
- A mature scale of investment brings down transaction costs
- For EU based companies: EU recognised regulations

Concluding

- Nature based solutions are an essential part of the ‘net zero’ goal
- Land use sector has certain ‘challenging factors’:
  - Millions of lands owners
  - diverse circumstances (you need to do something different everywhere)
  - Long term endurance is needed
  - uncertainty in results per hectare (difficult to measure)
  - High transaction cost

Still no doubt that we need to invest in renewable carbon when we cannot use the fossil carbon anymore

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In the end you have to start somewhere.

one of the Dutch pilots under Climate accord: walnut hybrid

https://www.vbne.nl/klimaatslimbosennatuurbeheer/

Thank you !

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https://www.wur.nl/en/Research-Results/Research-Institutes/Environmental-Research/Programmes/Green-Climate-Solutions.htm

https://www.wur.nl/nl/project/European-Forest-Resource-analysis-tools.htm

https://www.wur.nl/en/newsarticle/European-forests-can-mitigate-over-20-of-total-EU-greenhouse-gas-emissions.htm

https://landlifecompany.com/

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