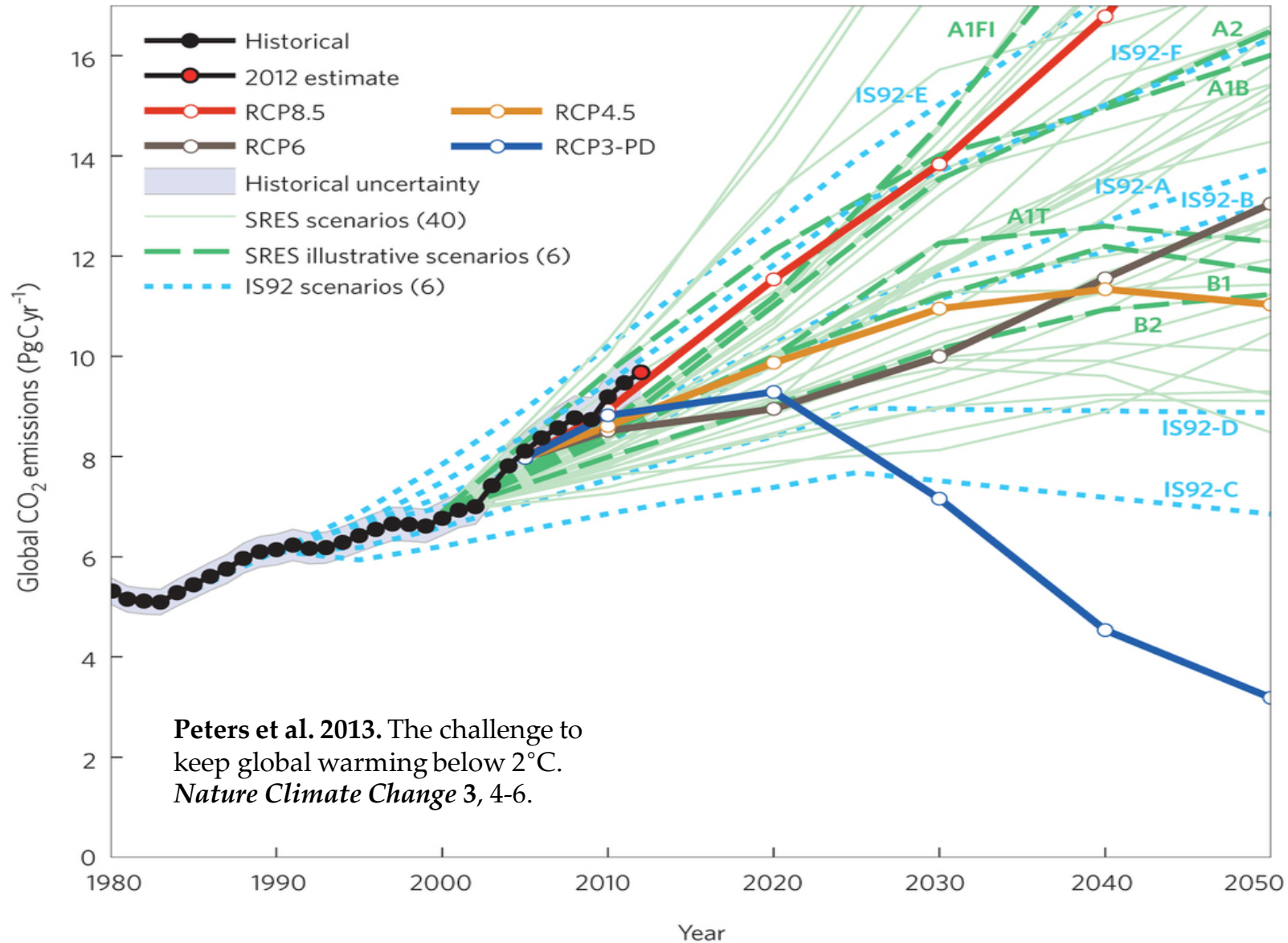# Mitigating climate change through Climate-Smart Forestry

Hans Verkerk

FORMASAM kick-off meeting, 12-14 November, Wageningen

29.11.2018 | WWW.EFI.INT

Emission trajectories

Peters et al. 2013. The challenge to keep global warming below 2°C. *Nature Climate Change* 3, 4-6.

National

Camp Fire kills 23, becoming California's deadliest wildfire since 1991

The Camp Fire in Northern California erupted Nov. 8, leaving a path of destruction and forcing tens of thousands of residents to evacuate their homes. (Taylor Turner/The Washington Post)

Donald J. Trump ✓ @realDonaldTrump · Nov 10

There is no reason for these massive, deadly and costly forest fires in California except that forest management is so poor. Billions of dollars are given each year, with so many lives lost, all because of gross mismanagement of the forests. Remedy now, or no more Fed payments!
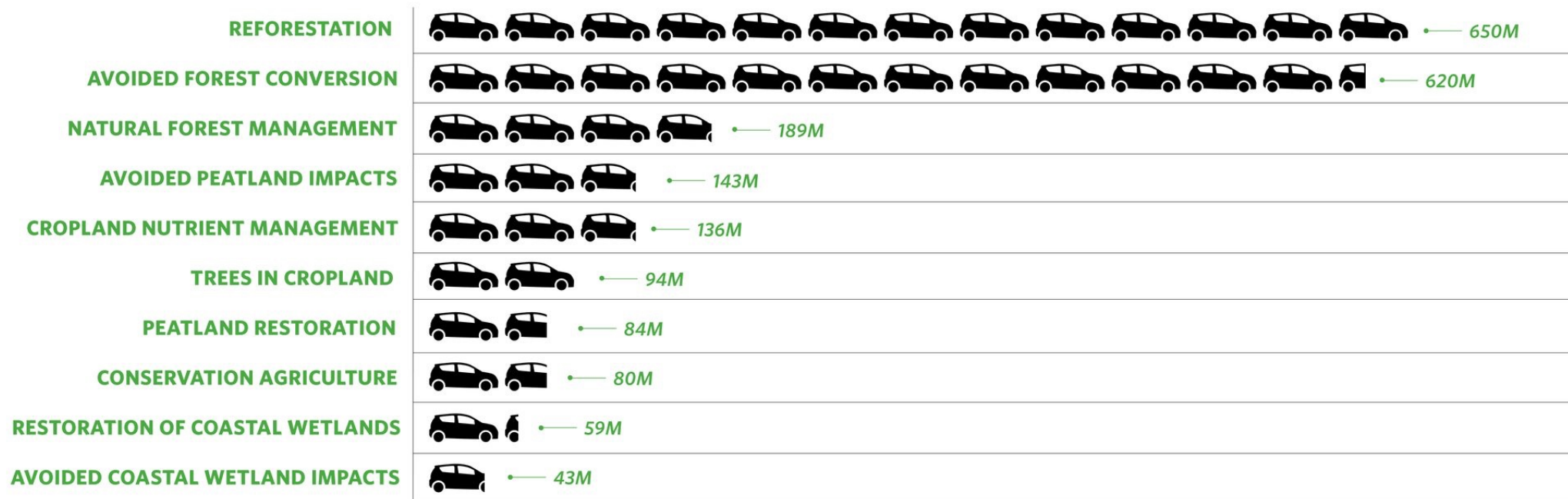
💬 94K   🔁 26K   ♡ 110K

Natural climate solutions

NATURAL CLIMATE SOLUTIONS

TOP 10 MITIGATION PATHWAYS[1] WITH CO-BENEFITS

Natural Climate Solutions have the same impact on emissions as taking millions of cars off the road

The Nature Conservancy

REFORESTATION	650M
AVOIDED FOREST CONVERSION	620M
NATURAL FOREST MANAGEMENT	189M
AVOIDED PEATLAND IMPACTS	143M
CROPLAND NUTRIENT MANAGEMENT	136M
TREES IN CROPLAND	94M
PEATLAND RESTORATION	84M
CONSERVATION AGRICULTURE	80M
RESTORATION OF COASTAL WETLANDS	59M
AVOIDED COASTAL WETLAND IMPACTS	43M

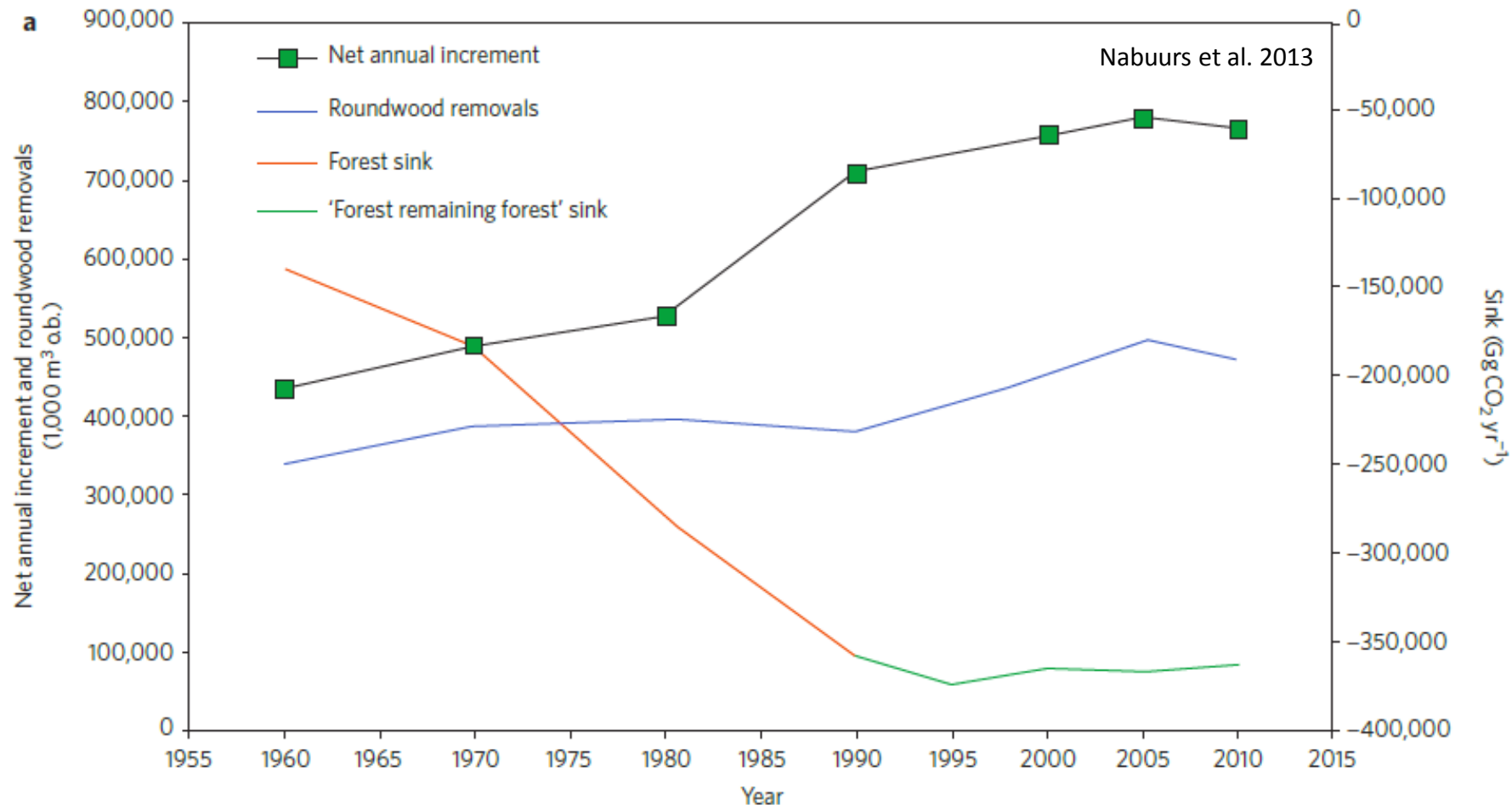*Global Mitigation Potential: Approximate Number of Cars Removed Each Year in Millions*

= 50M cars

[1]Cost-Effective

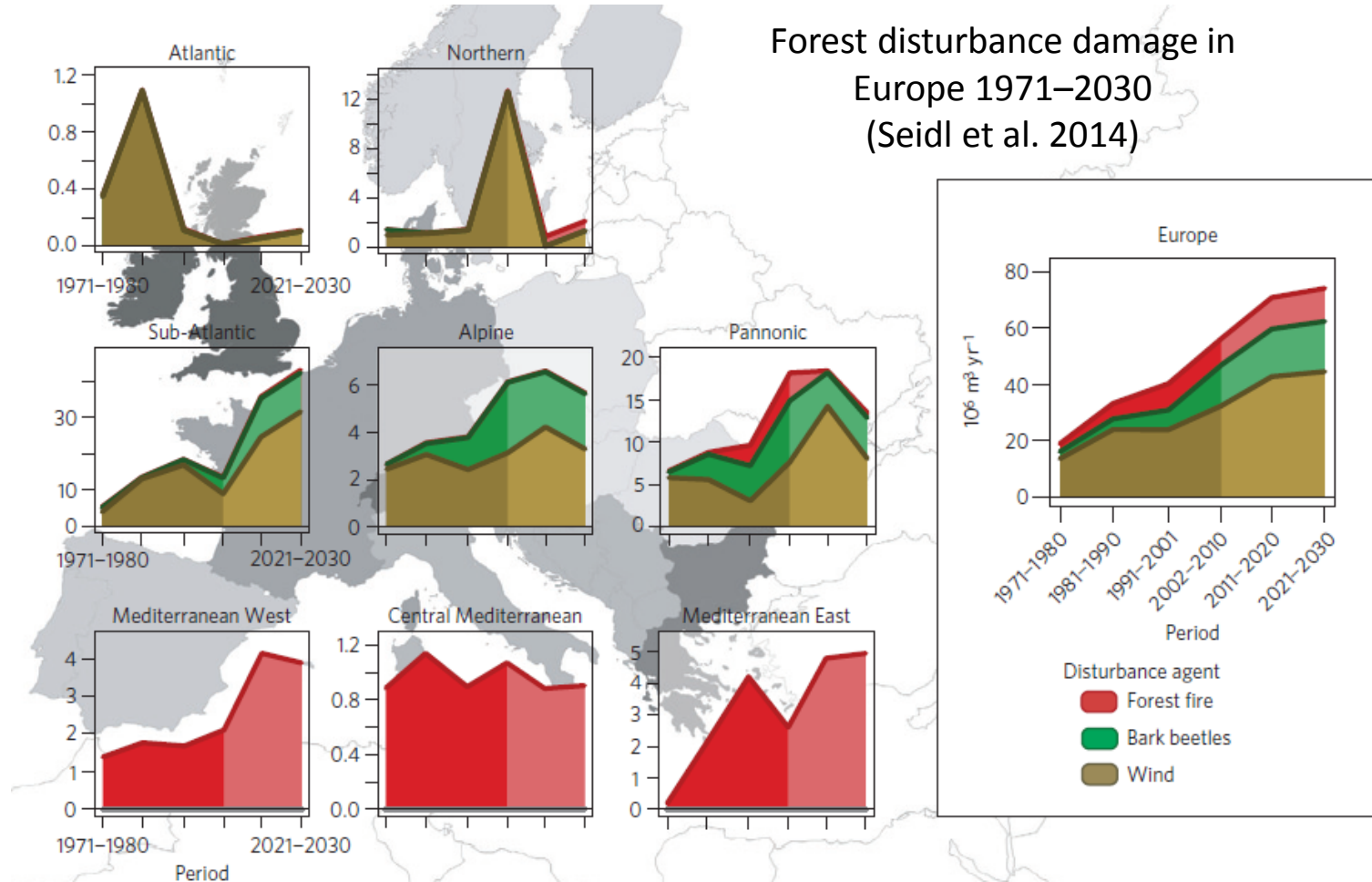Griscom et al. 2017 / figure from twitter

Natural climate solutions, but….

- A biological sink will eventually saturate

Nabuurs et al. 2013

Natural climate solutions, but….

- Storing carbon in the forest is not free of risk

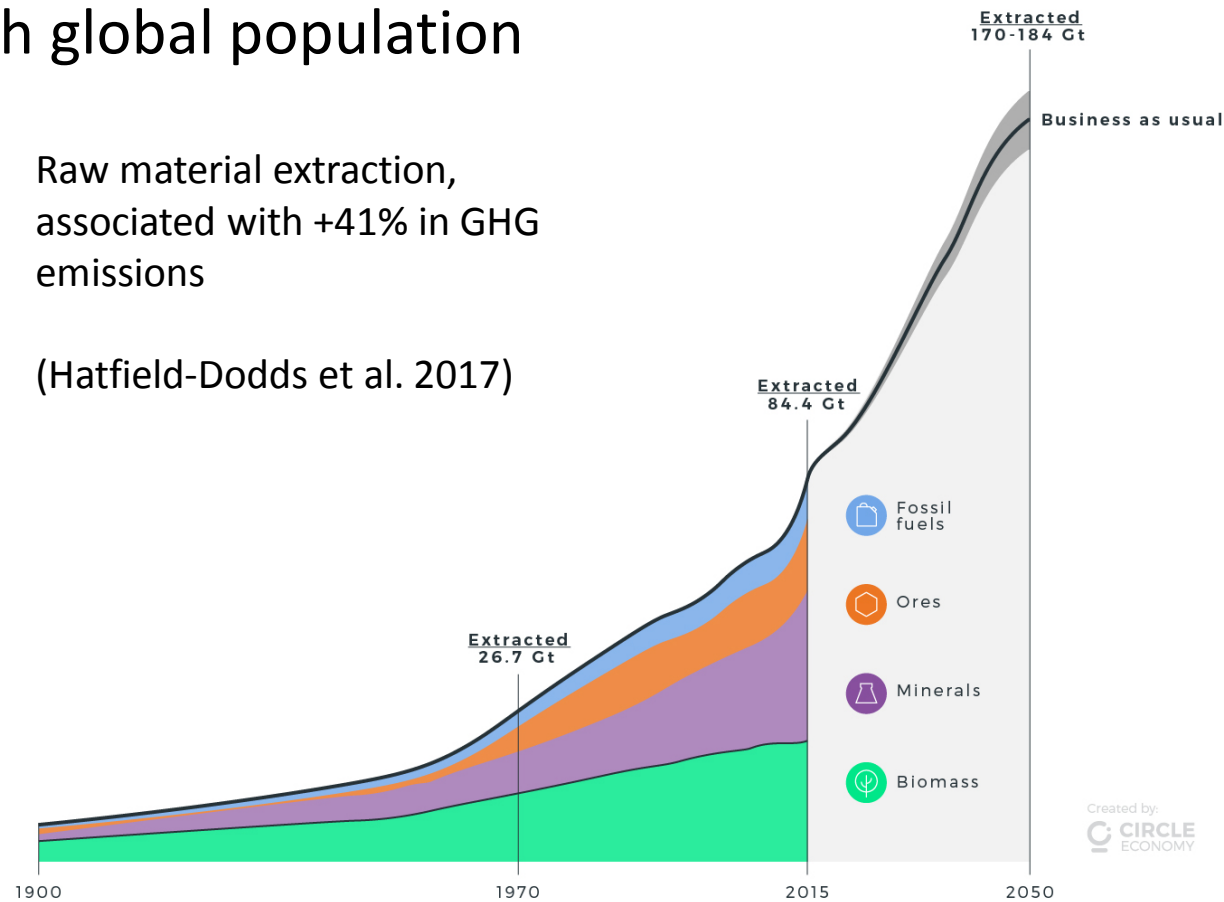Forest disturbance damage in Europe 1971–2030 (Seidl et al. 2014)

Natural climate solutions, but….

- There will be an increasing demand for materials to meet the demands by a growing and increasingly rich global population

Raw material extraction, associated with +41% in GHG emissions

(Hatfield-Dodds et al. 2017)

Climate-Smart Forestry

- Smart approaches are needed that are spatially diversified and combine mitigation and adaption;

- There is no "one-size-fits-all" solution;

- CSF builds on the concepts of sustainable forest management, but has a clear climate focus and builds on three mutually reinforcing components:

  1. Increasing carbon storage in forest ecosystems;

  2. Enhancing the resilience of forest ecosystems through adaptive forest management;

  3. Using wood resources sustainably to substitute non-renewable, carbon-intensive materials

Increasing carbon storage in forest ecosystems

- "No brainers"
  - Increase global afforestation
  - Decrease global deforestion
- Importance of forest management underestimated
  - Prevent degradation from poor forest management practices
  - Management of afforested areas (species selection, tending, thinning,…..)
- Improved management practices
  - Species and provenance selection, tending, thinning,….
  - Improved spatial planning of practices
  - Some measures may take long to have effect, but should not be ignored!
- Reduce / mitigate effects of disturbances

Increasing carbon storage in forest ecosystems

- Examples of smart forestry (Nabuurs et al. 2013):

  - Conserve high carbon-stock densities in old forests that are not at a high risk of disturbance;

  - Conserve high carbon-stock forests on sensitive sites, high soil carbon sites and steep slopes;

  - Optimize silvicultural techniques (such as planting, tending and harvesting) to arrive at a carbon-efficient management scheme in forests that are grown primarily for timber;

  - Actively manage (mature) forests that are at high risk of disturbance;

  - Improve the management and protection of fire-prone forests to safeguard their carbon stocks.

Sustainable use and substitution

- Development of a sustainable bioeconomy may provide new value chains and incentives for forest management

Sustainable use and substitution

- If more wood used → reduction in short to medium term forest sink

- BUT:
  - Roundwood could be used for products → carbon accounted as Harvest Wood Products
  - Roundwood could substitute steel, glass or concrete → savings in other emission sectors
  - Wood (e.g. residues, waste) could substitute fossil fuels → savings in other emission sectors

- Often (mis)used substitution value: 2.1 tC / tC (Sathre and o'Connor 2010)

Sustainable use and substitution

- New evidence from a meta-review the literature (Leskinen et al. / Verkerk et al.) :
  - Average substitution probably around 1.2 tC / tC
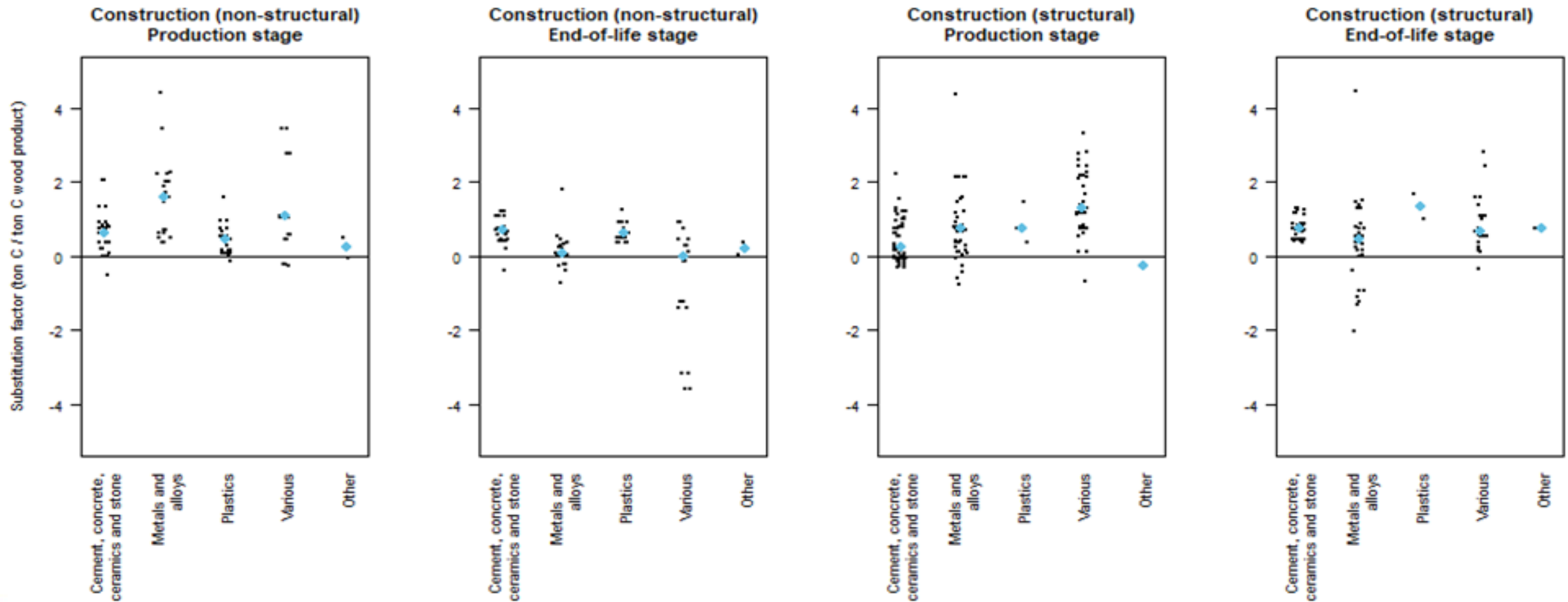
Mitigation potential of Climate-Smart Forestry

Table 1. Summation of the Climate Smart Forestry mitigation effect. All numbers are approximations.

Main Category of Forest Management Measure	Sub Measure	Mitigation Effect (Mt CO_2 a^{-1})
1. Improved forest management		172
	1a. fullgrown coppice	56
	1b. enhanced productivity & improved management	38
	1c. reduced disturbances, deforestation, drainage	35
	1d. material substitution wood products	43
2. Forest area expansion		64
3. Energy substitution		141
4. Establish forest reserves		64
Total		441

Nabuurs et al. 2017

Concluding remarks

- Forest management practices need to consider both mitigation and adaptation;

- Don't "put all eggs in one basket";

- Optimal strategies need to consider carbon balances of forest ecosystems, (long-lived) wood products and substitution effects, in the long-term;

- Better understanding needed of substitution effects, especially of newly emerging wood-based products;

- Better understanding needed on all effects on climate, not just carbon (cf. Luyssaert et al. 2018).

Concluding remarks

Donald J. Trump ✔ @realDonaldTrump · 4h ⌄

With proper Forest Management, we can stop the devastation constantly going on in California. Get Smart!

💬 14K   🔁 8.2K   ♡ 37K

Thank you!

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