



Tool for Simulation of Forest Mitigation Potentials

Volker Mues,
K. Olschofsky, B. Kenter & M. Köhl

Thünen Institute for World Forestry



Introduction

1. Introduction
2. C-Potentials in forests and timber
3. Data and Models
4. Exemplary Results
 - a) Carbon in forests and timber
 - b) C turnover in forests and timber
5. Next steps
6. Conclusions

Institute for World Forestry



Universität Hamburg

DER FORSCHUNG | DER LEHRE | DER BILDUNG

contribute to the conservation and environmentally sound development of the world's forests with research of third-party funds.

→ concepts and strategies for the sustainable management of forests worldwide

→ lectures at the Center of Wood Science and Technology



Johann Heinrich
von Thünen-Institut

→ scientific decision support for legal and administrative tasks of the German Federal Government and on international level



Institute for
**World
Forestry**

head:

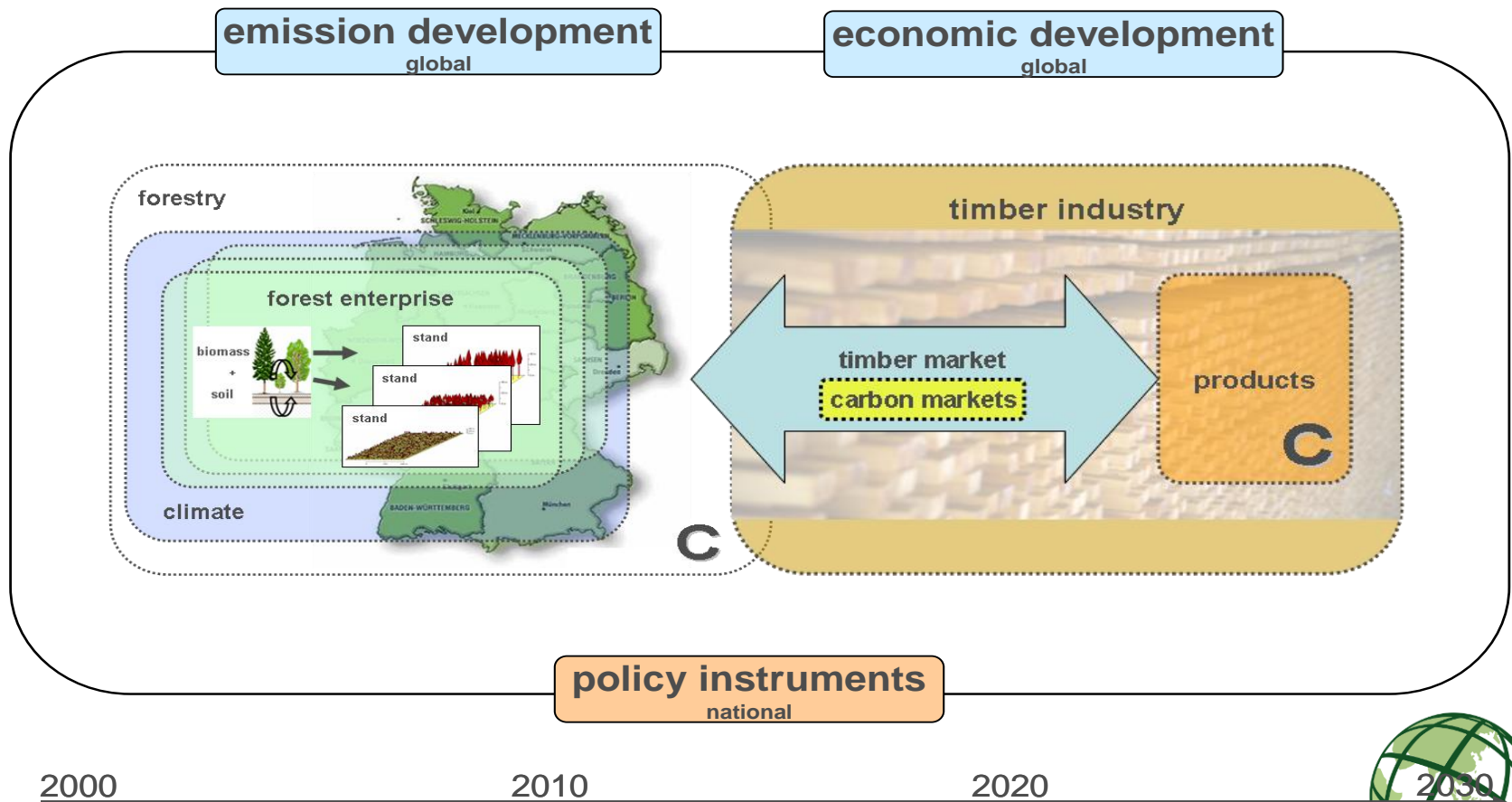
Prof. Dr. Michael Köhl

about 37 employees, 25 scientists

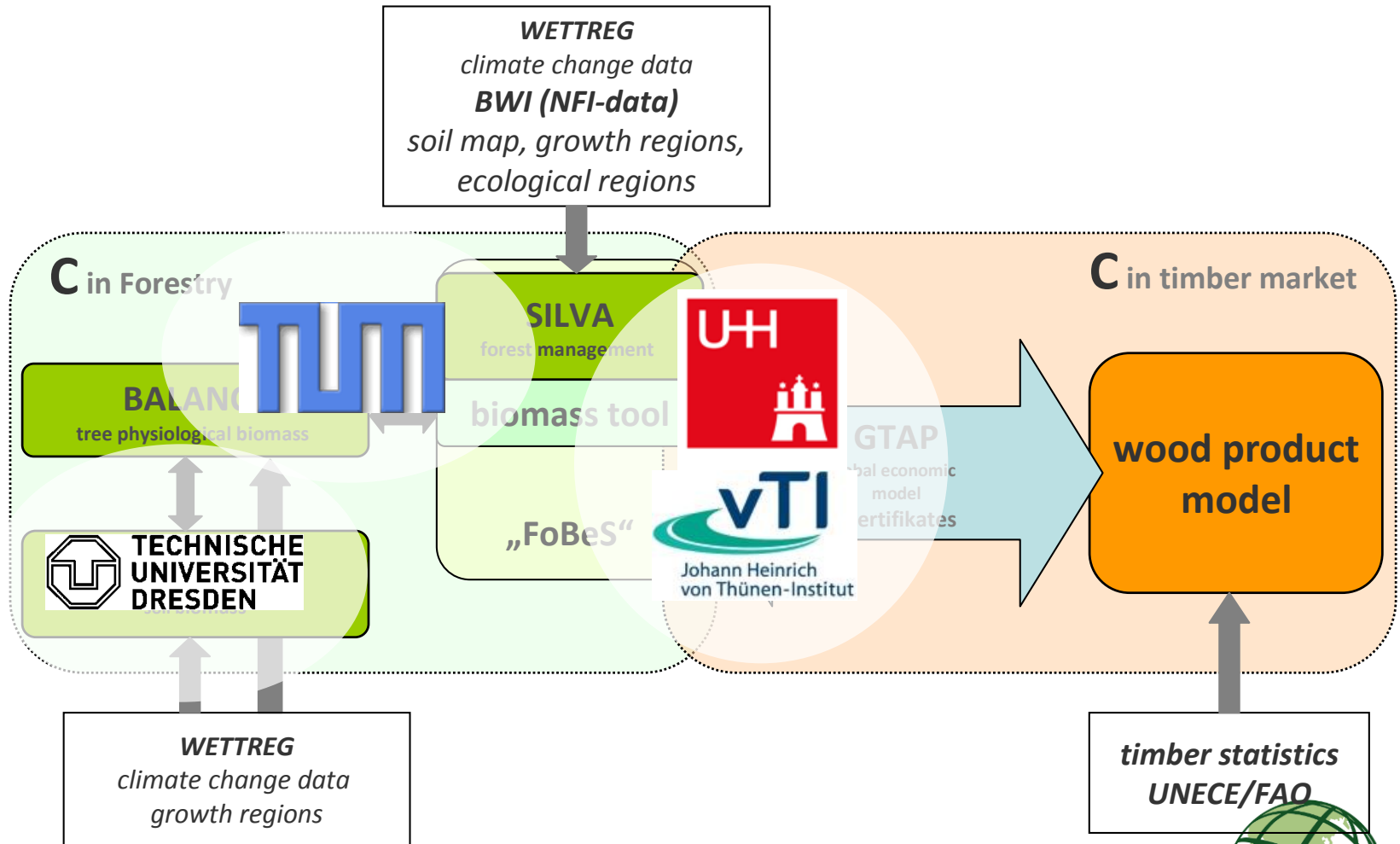


Institute for
**World
Forestry**

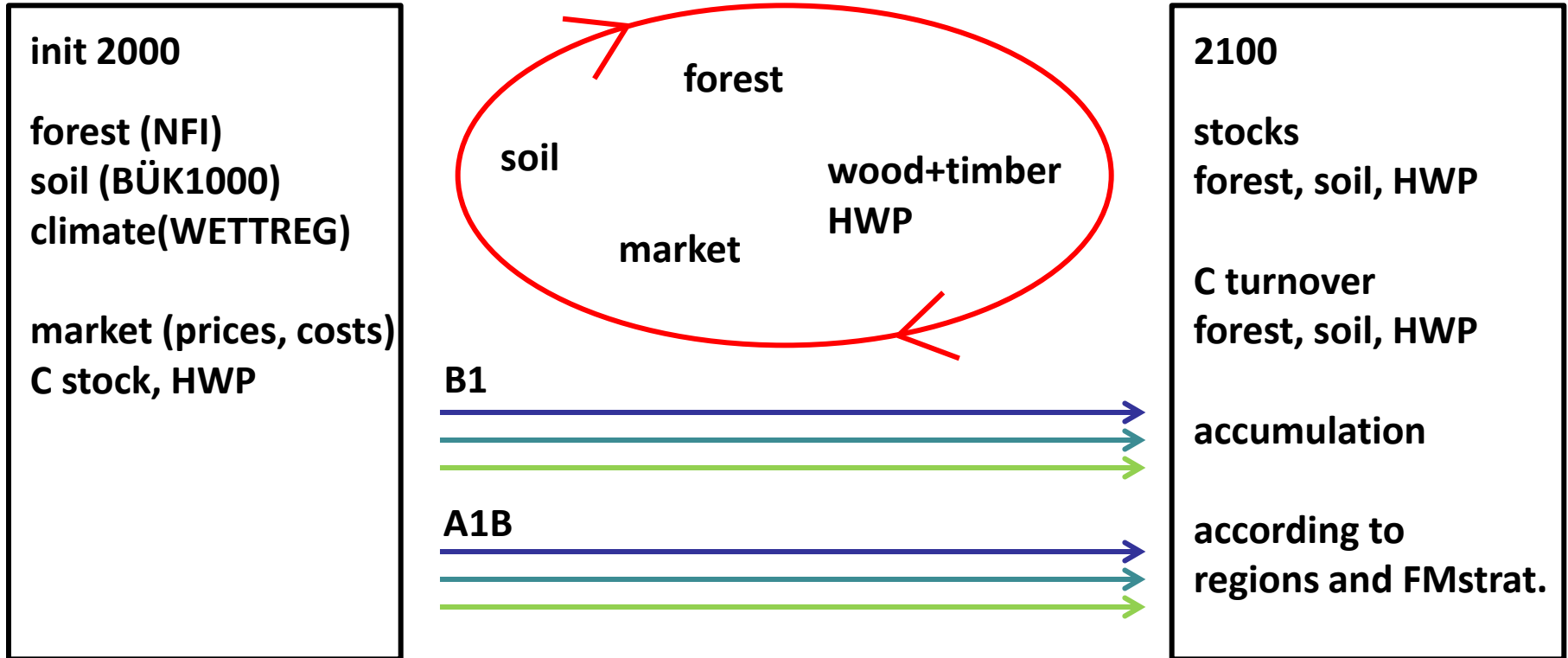
www.cswh.worldforestry.de



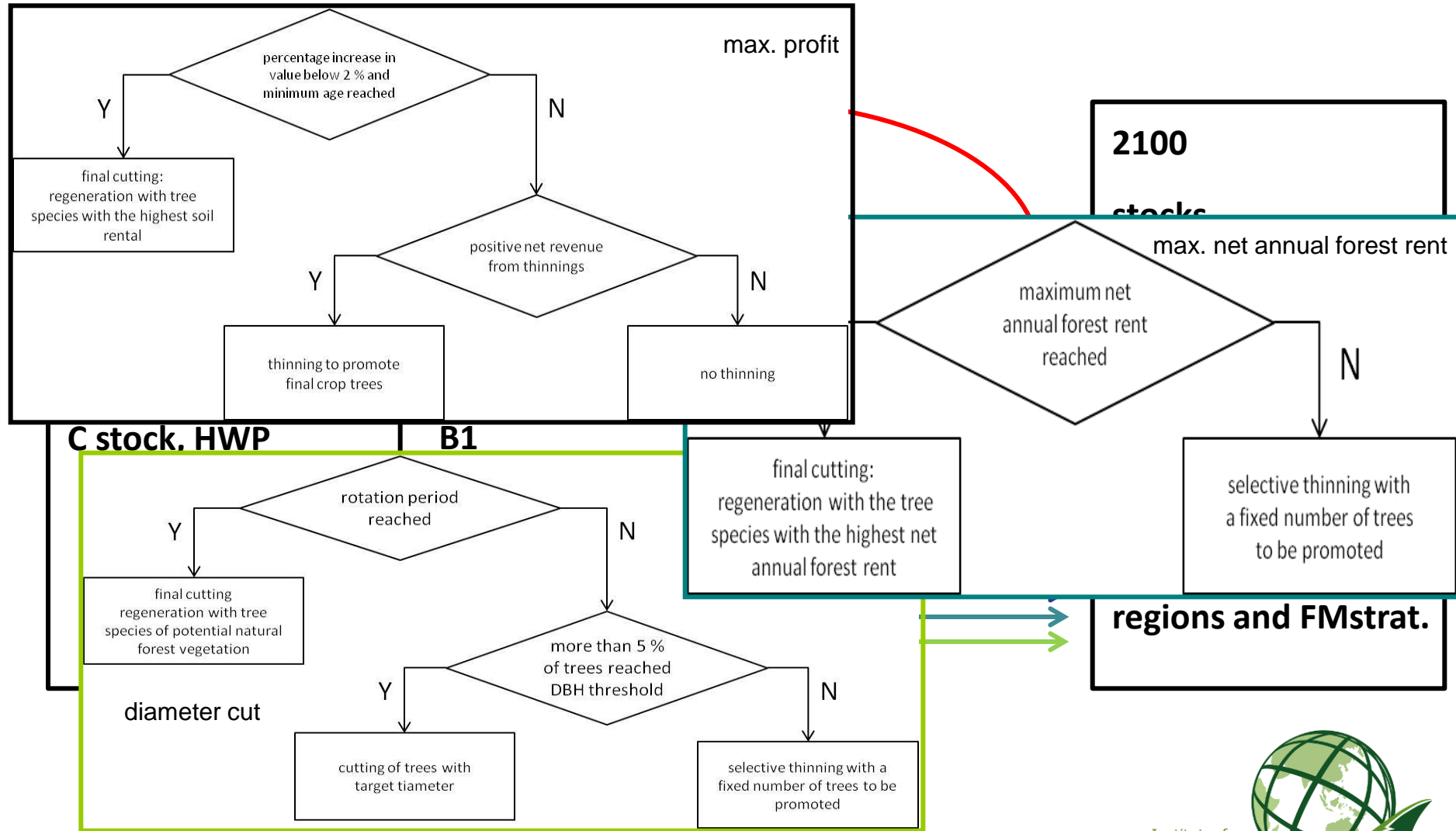
modules



module integration & sim. runs



module integration & sim. runs



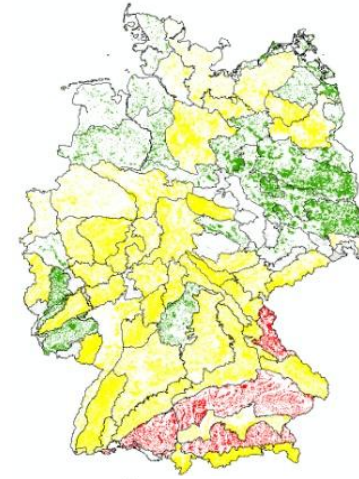
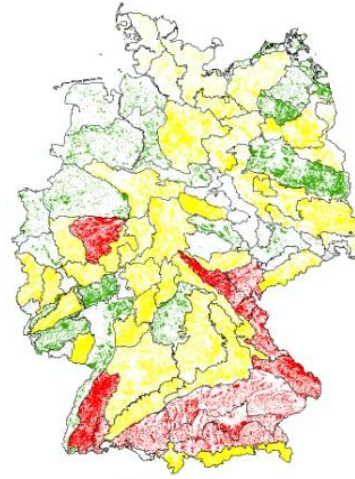
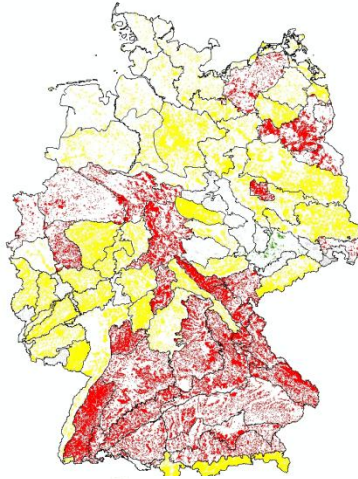
Results: carbon stock change (2000 to 2100)

max. profit

max. net a.f. rent

diameter cut

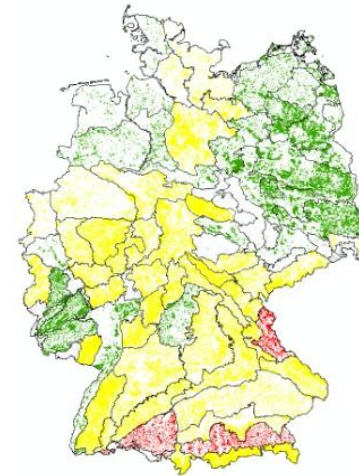
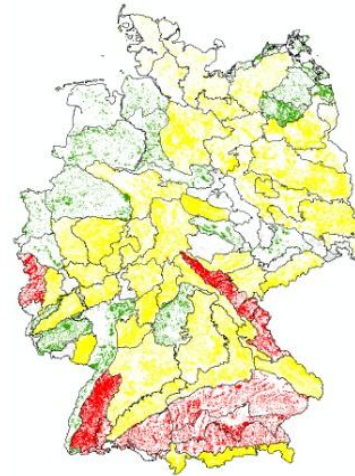
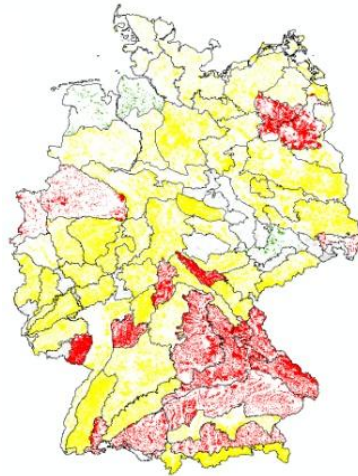
B1



diff C
[t C / ha]



A1B



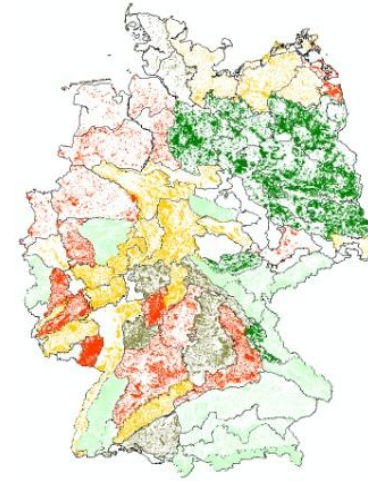
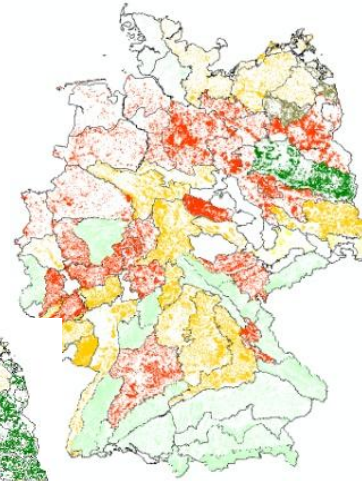
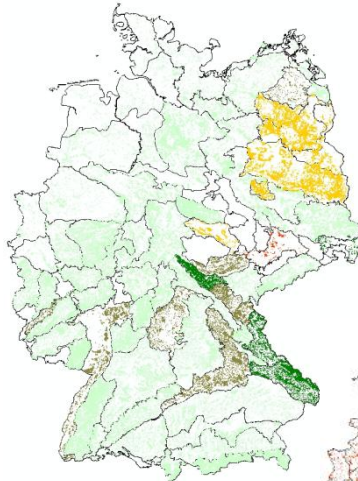
Results: dominating tree species in 2100

max. profit

max. net a.f. rent

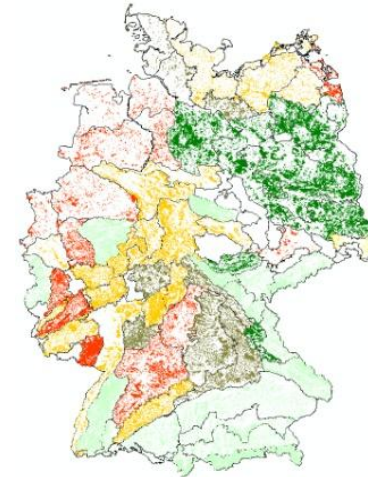
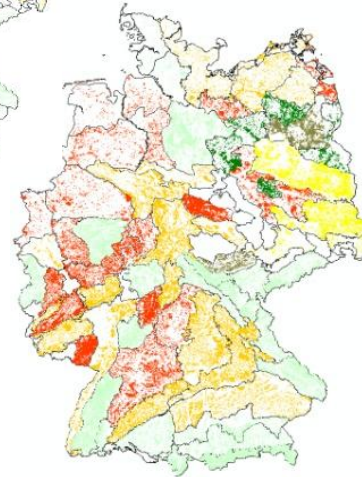
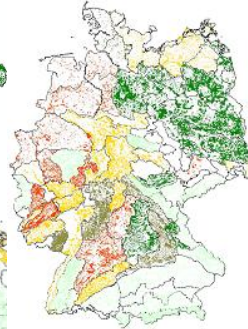
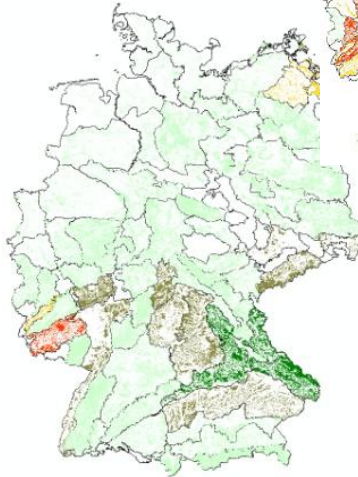
diameter cut

B1



- oak
- beech
- broadleaves
- N. spruce
- Scots pine
- coniferous

A1B



Institute for
**World
Forestry**

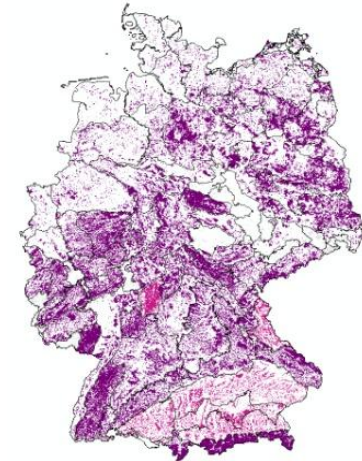
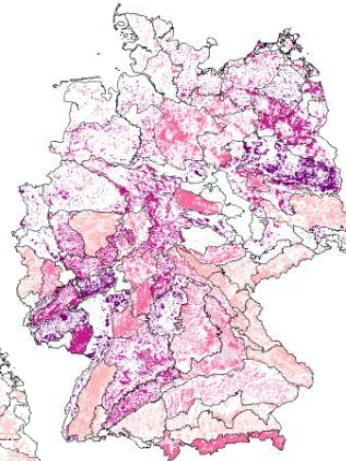
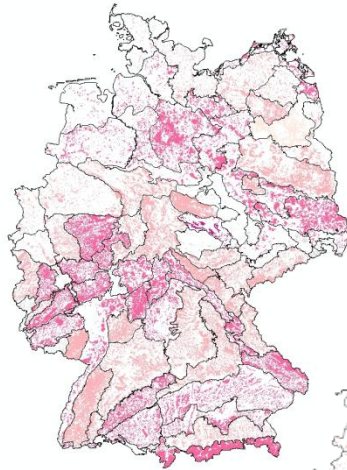
Results: mean age in 2100

max. profit

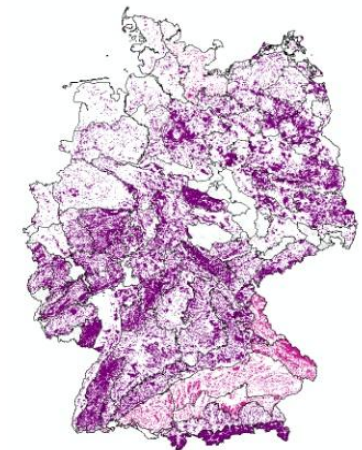
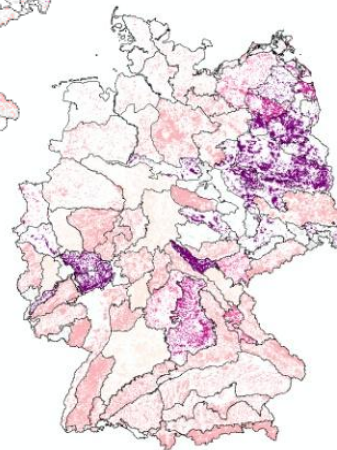
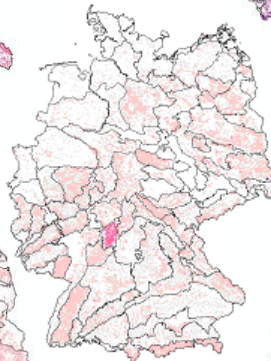
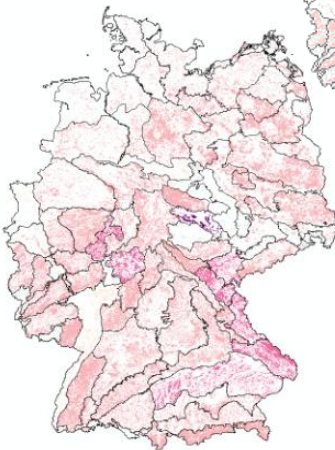
max. net a.f. rent

diameter cut

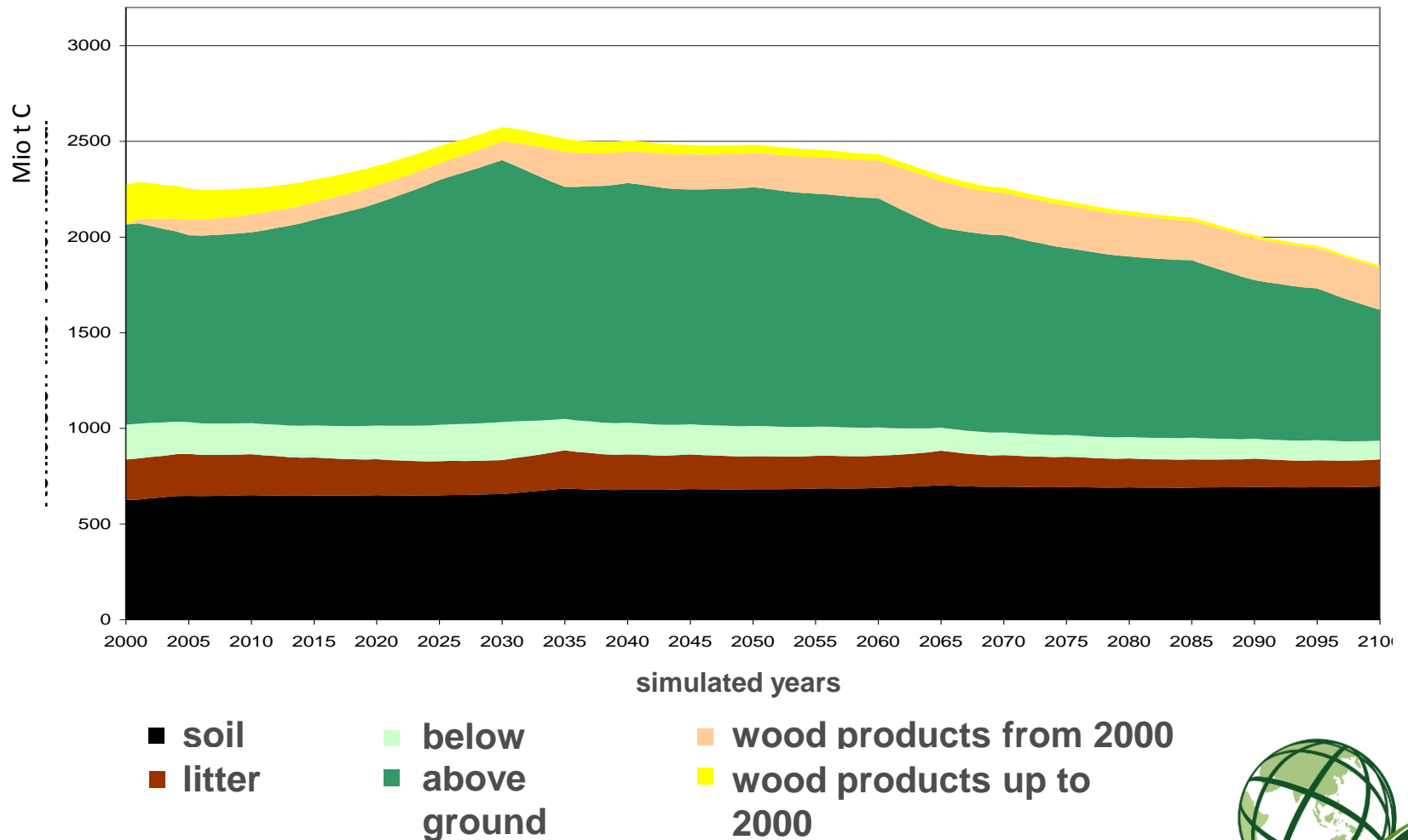
B1



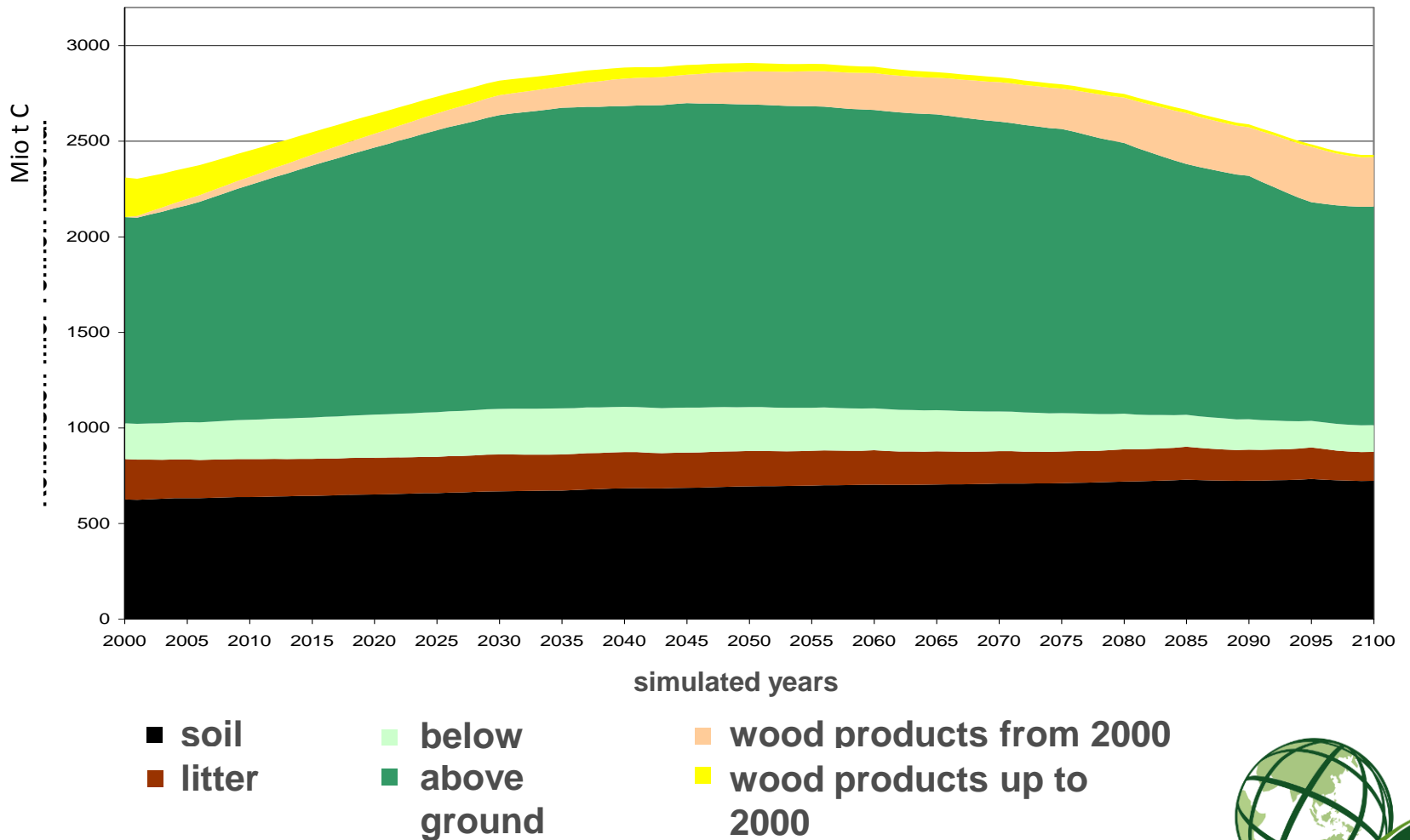
A1B



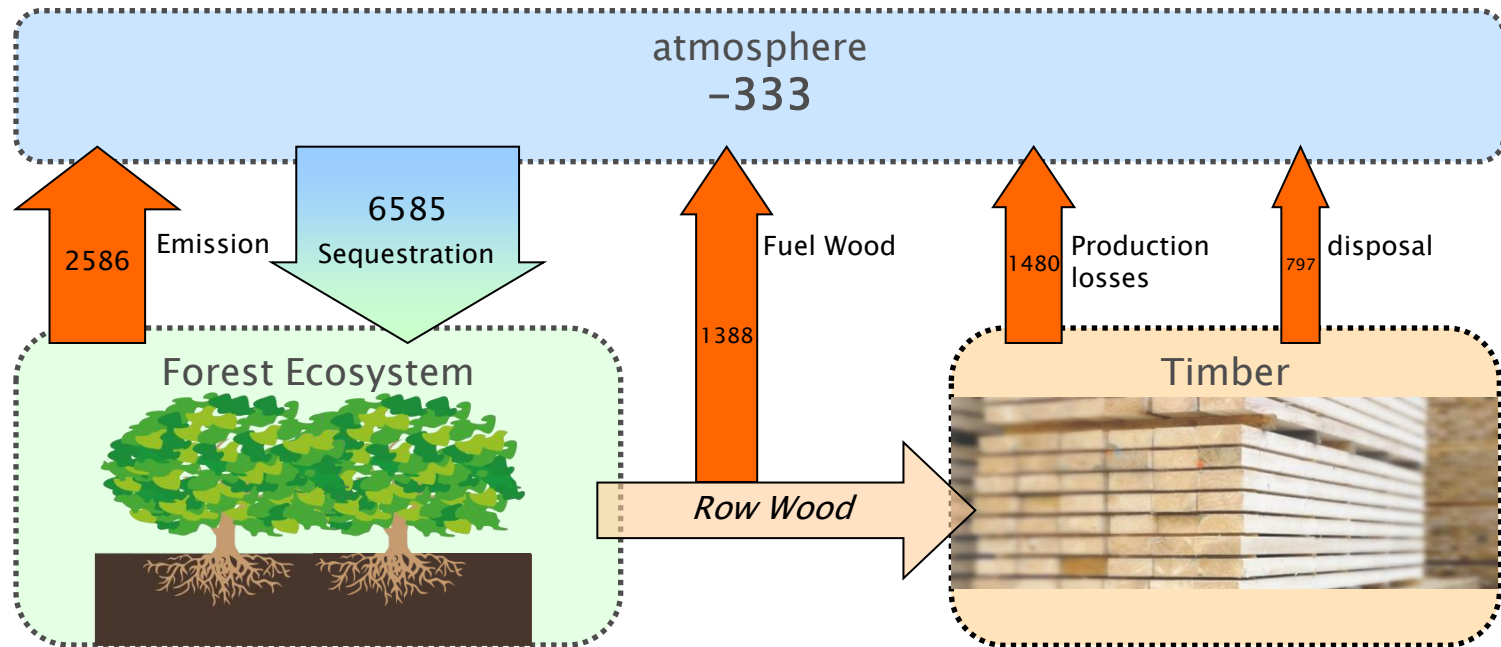
carbon stock: maximising profit B1



carbon stock: maximising net yield B1

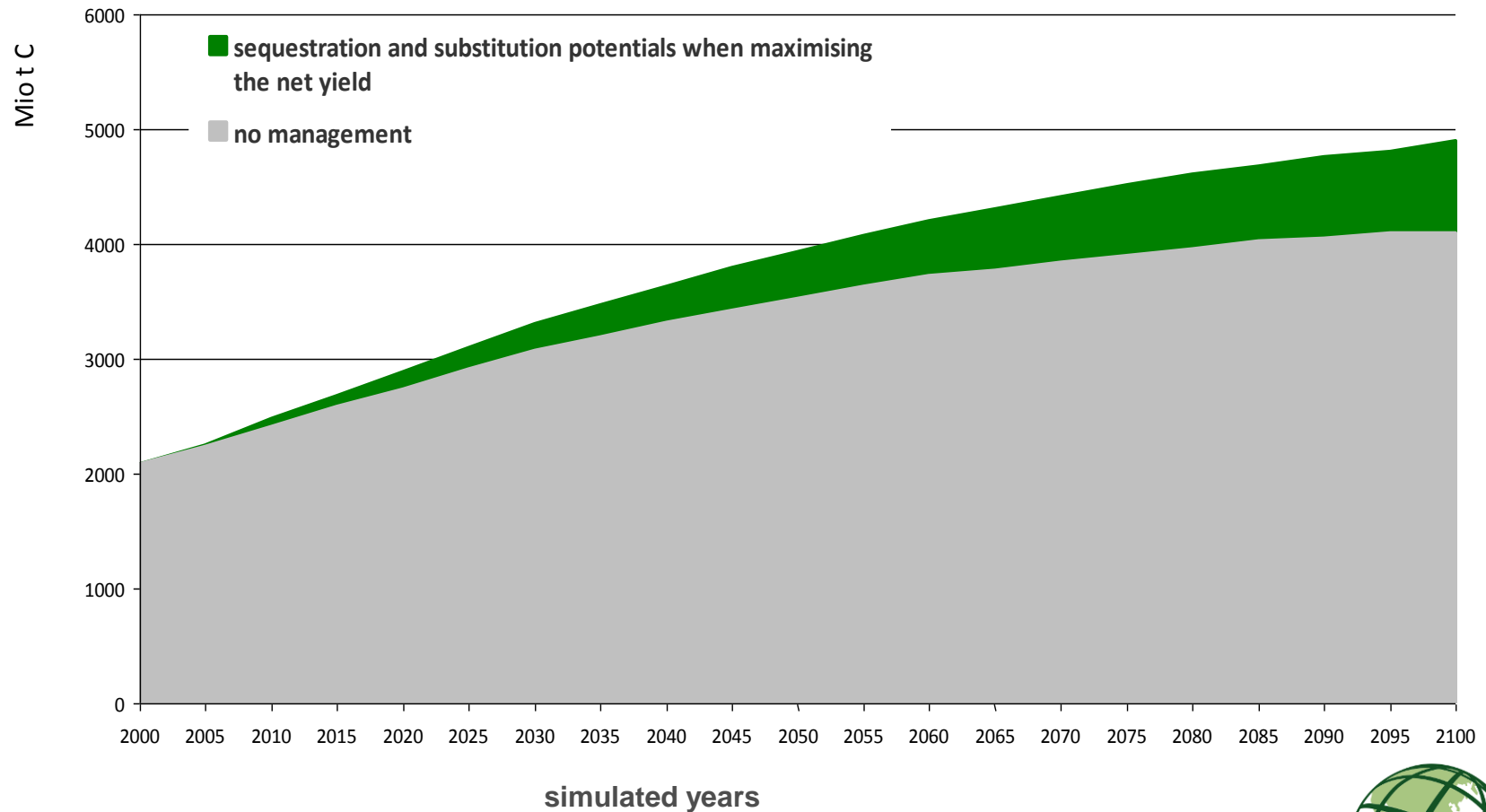


C turnover: maximising net yield B1 2000 - 2100



Mio t C

maximising net yield compared to no use (B1)



[Köhl et al. 2009]



next steps

www.worldforestry.de/FORMIT

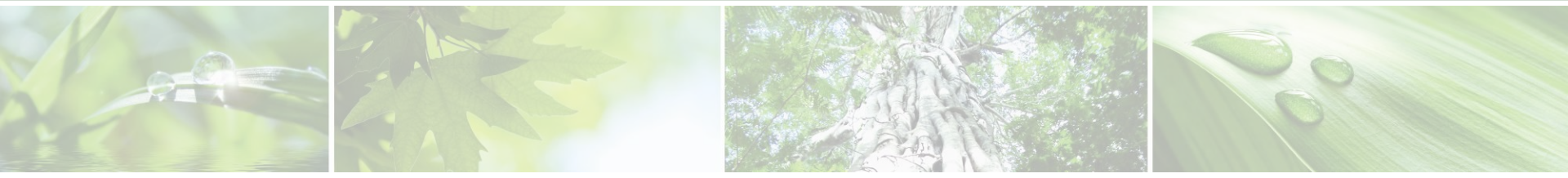
FORMIT (7th FP)

- potentials of climate change mitigation
- regions (with historical forest management)
- RAMPs (representative adaptation and mitigation pathways)
- mitigation in framework of forest functions
(sustainability of soils, biodiversity, ...)



Conclusions

- 1. Sustainable forest management and timber utilisation contributes to climate change mitigation more than protected forests**
- 2. Forestry can optimise the climate effect by tree species selection and management strategy**
- 3. Timber sector can optimise its contribution to mitigate climate change by substituting products with intensive emissions and innovative products might change/improve the mitigation potential of the timber section significantly**
- 4. European Framework to assess mitigation scenarios for eco-regions (FORMIT)**



References

Köhl M. et al. 2010 Combating the Effects of Climatic Change on Forests by Mitigation Strategies. Carbon Balance and Management. In review.

Köhl M. et al. 2009 Reduced emissions from deforestation and forest degradation (REDD): a climate change mitigation strategy on a critical track in Carbon Balance and Management 2009 on 13 November 2009
<http://www.cbmjournal.com/content/4/1/10>

Albrecht S. et al. 2008 ÖkoPot - Ökologische Potenziale durch Holznutzung gezielt fördern. Abschlussbericht zum BMBF-Projekt FKZ 0330545, Stuttgart, 298 S.



equations

$$\sqrt[5]{\frac{A_{t+5}}{A_t}} - 1 < 0,0p$$

max. profit decision on harvesting

$$b_{b(\max)} = \frac{0,0p * (A_u + \sum (D_n * 1,0p^{u-n}) - c * 1,0p^u)}{1,0p^u - 1}$$

max. profit decision on reg. tree spec.

$$r_{b(\max)} = \frac{A_u + \sum D_n - c}{u}$$

max. net annual forest rent:
dec. on harvesting and
on regeneration tree species