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Seed4forest: Decision Support tool for adapting European forests to climate change

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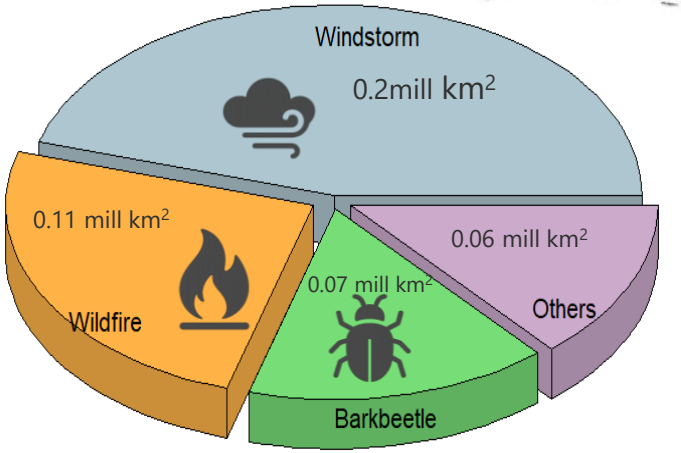
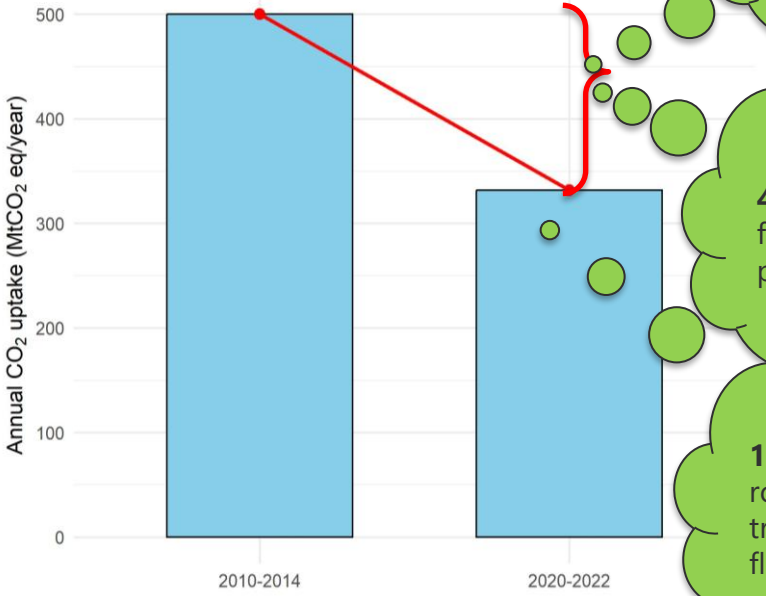
Forest Degradation in Europe

1985-2023

0.44 million km²



Loss of 168 $MtCO_2$ eq/year



365 million cars pr year

48 large coal-fired power plants

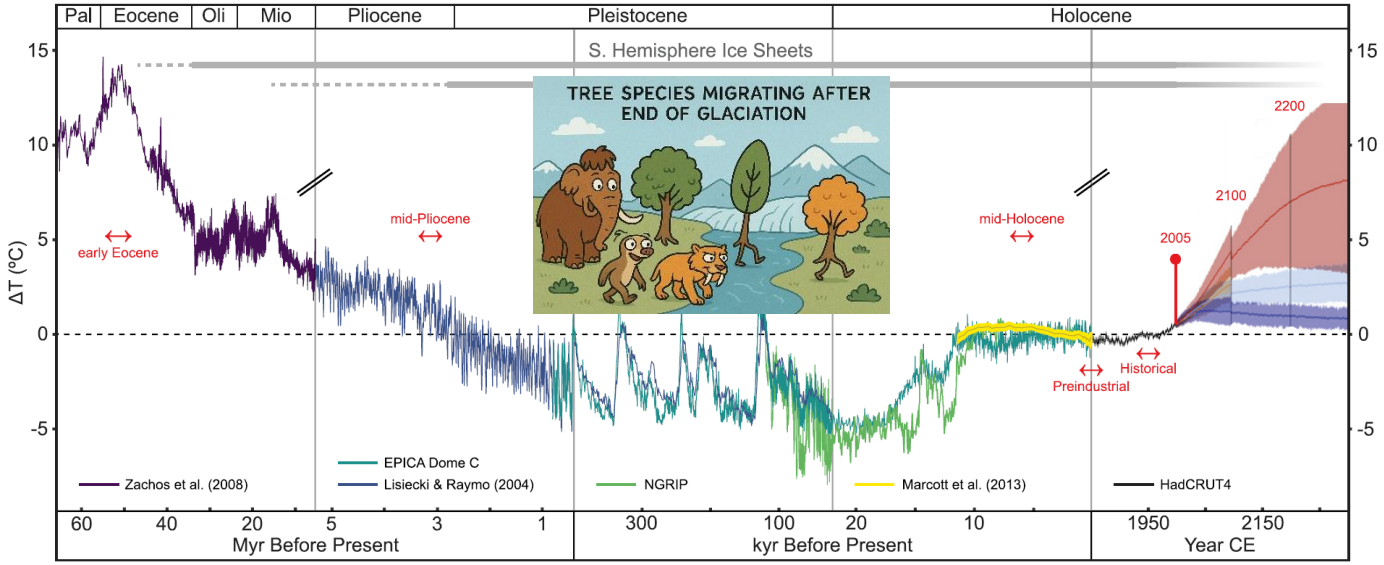
168 million round-trip transatlantic flights

Soto et al 2025: The European Forest Disturbance Atlas

Past climate change and Europe's tree diversity dilemma

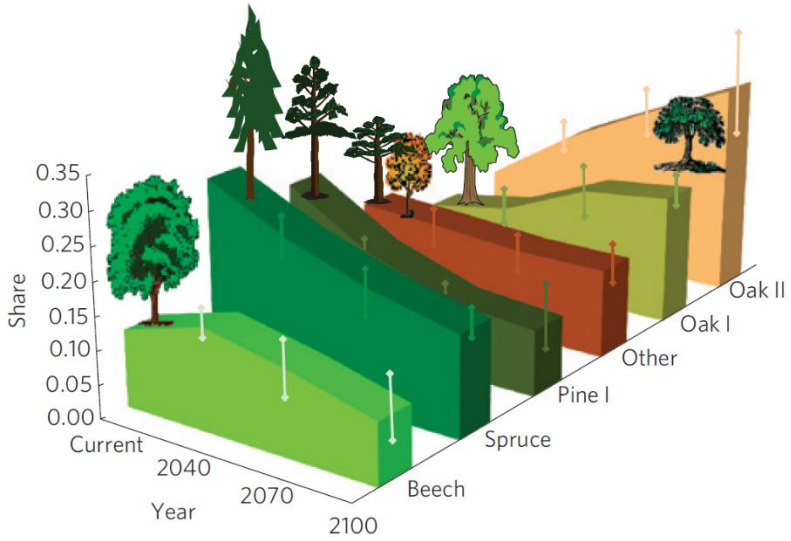
Fossil tree genera		Surviving until Holocen	
60	Eastern North America	49	(82%)
75	Western North America	35	(47%)
122	North/East Central Asia	117	(96%)
130	Europe	38	(29%)

Latham & Ricklefts 1993

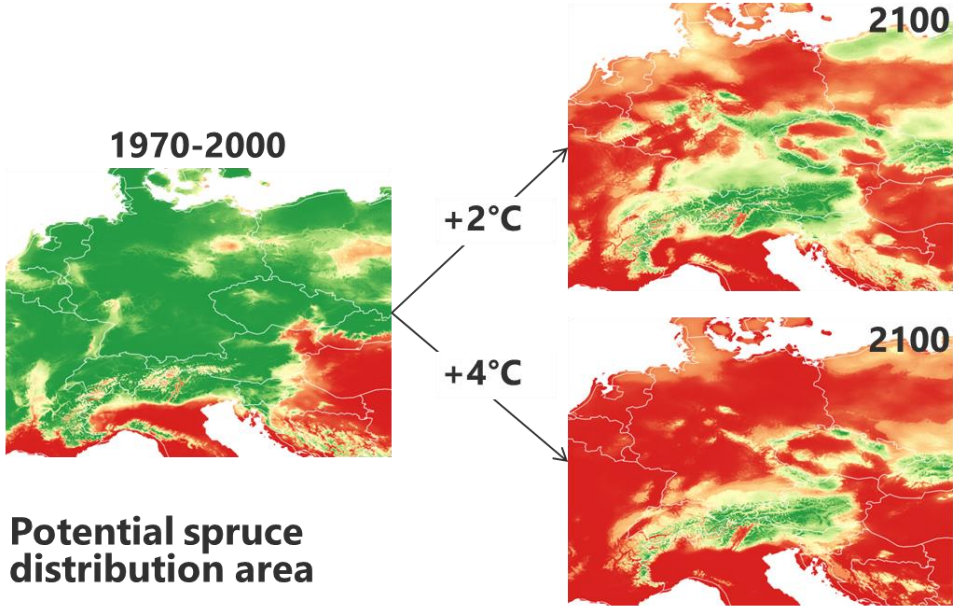


Burke et al. PNAS (2018)

Predicted tree species change

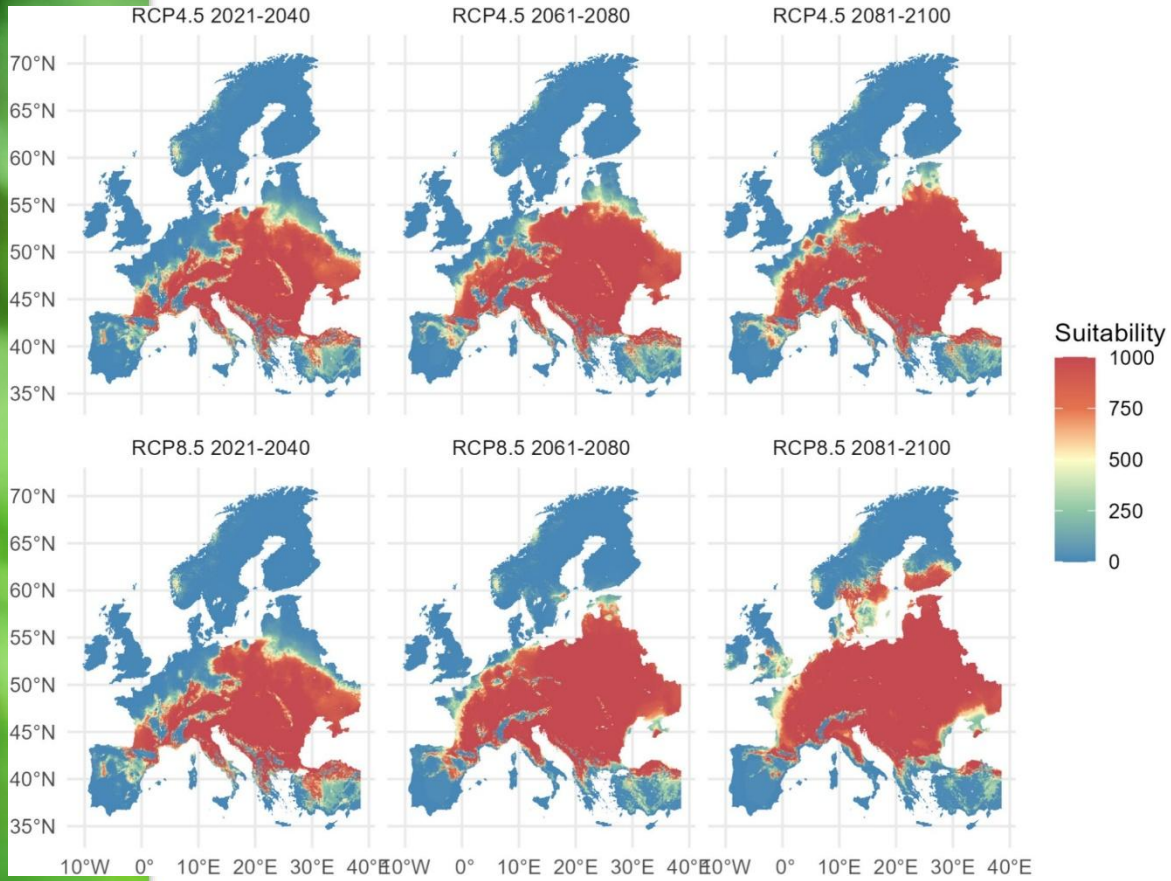


Hanewinkel et al. 2012



Chakraborty et al. 2021

New Invasions



Oak lace bug on the rise

Cieceu, & Chakraborty et al 2024

Pests and pathogens!

Austrian pine

Diplodia pinea

Photo: Schüler, BFW

Beech

Photo: Schüler, BFW

Ash

Hymenoscyphus fraxineus

Photo: Kirisits, BOKU

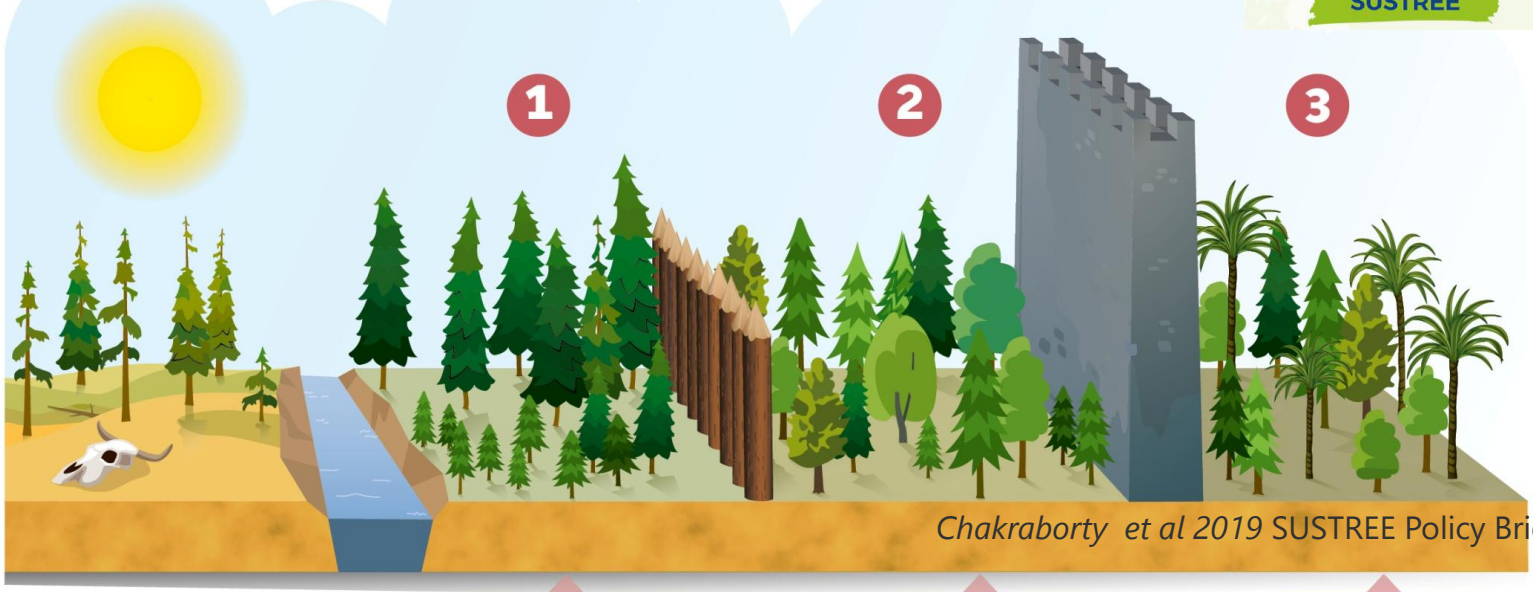
Photo: Hoch, BFW

Huge demand of FRM for forest restoration

- 2billion seedlings/year
- Demand is likely to go up in the future
- Use of local FRM
- Norway spruce accounts for 82% of all tree seedlings in cross-border trade.

Jansen S, etal (2019)

Three lines to defend forest ecosystem services in climate change



Chakraborty et al 2019 SUSTREE Policy Brief II

Assisted Migration, climate resilient genotypes, stronger thinning measures

Planting other native species and species mixtures

Planting non-native tree species

Effects of assisted migration on above ground carbon sink in European Forests

nature climate change

Article | Open access | Published: 25 July 2024

Assisted tree migration can preserve the European forest carbon sink under climate change

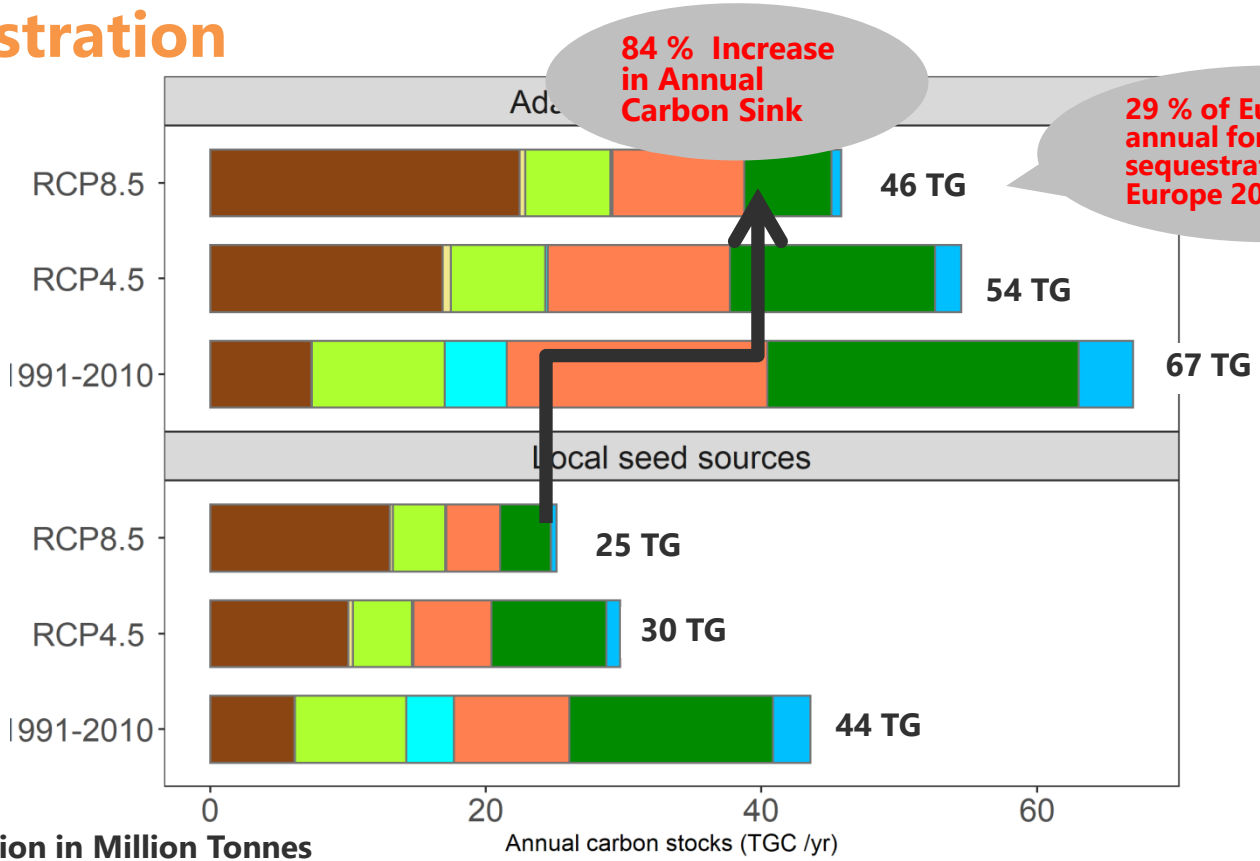
Debojyoti Chakraborty, Albert Ciceu, Dalibor Ballian, Marta Benito Garzón, Andreas Bolte, Gregor Bozic, [illegible] Čepl, Eva Cremer, Alexis Ducousso, Julian Gaviria, Jan Peter George, André [illegible], [illegible] Ivankovic, Marcin Klisz, Jan Kowalczyk, Antoine Kremer, Milan Lstibůrek, Roman

Impact of forest adaptation strategies on carbon sequestration

Comparing:

Carbon sequestration under assisted migration

Carbon sequestration by local seed sources

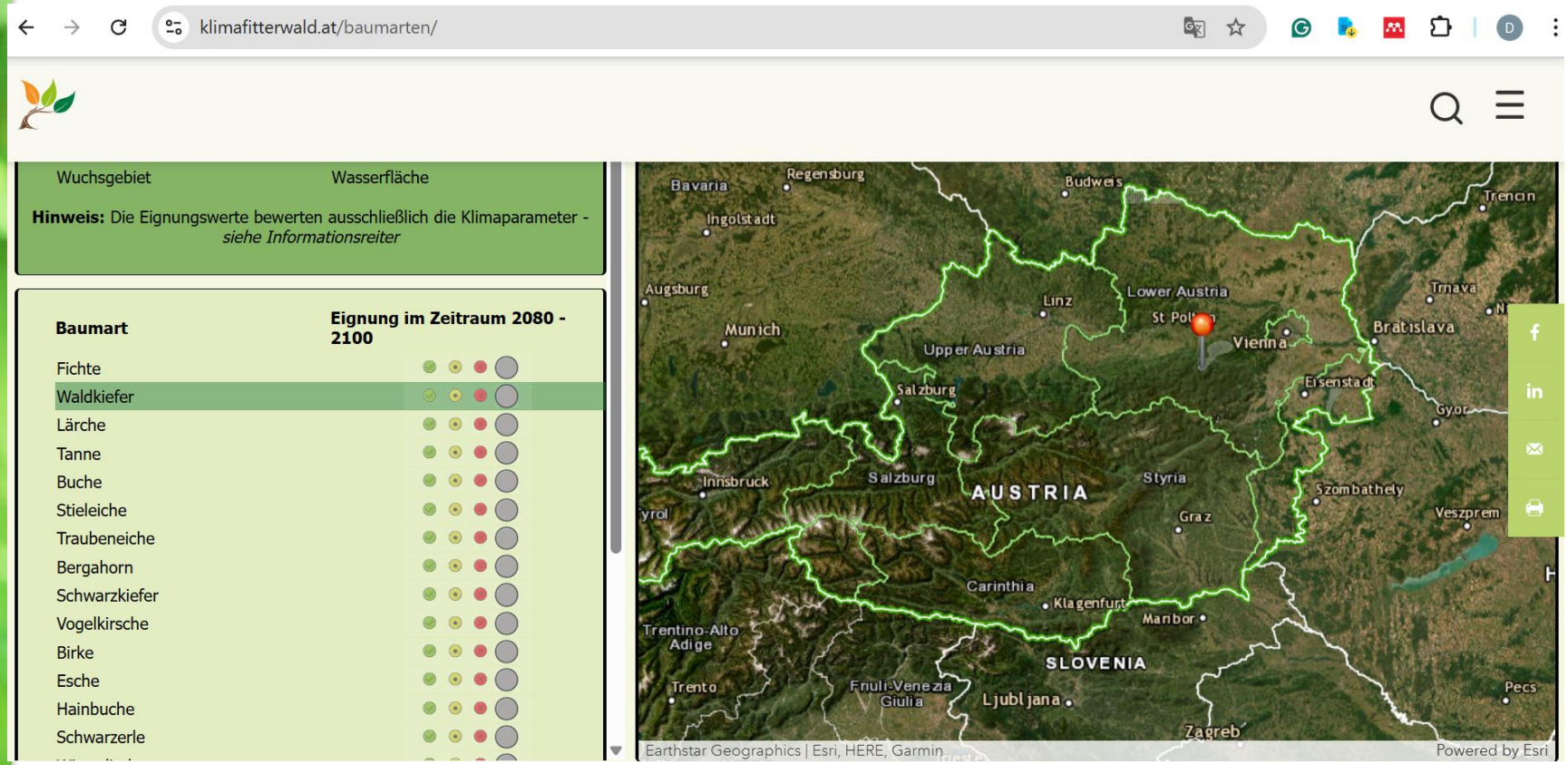


Annual Carbon Sequestration in Million Tonnes or Terragram in above ground living biomass of Age Classes I+II (until 40 years)

(Chakraborty et al. 2024, Nature Climate Change)

Decision support tools

Baumartenampel: tree species traffic light



Seed4Forest

FOREST VULNERABILITY AND SEED TRANSFER TOOL

https://app.seed4forest.org

Other Decision Support Systems from BFW

For Forest Innovation tool

Makes realtime 3D Visualization of future forests based on adopted management scenarios

https://www.forforestinnovation.com/

Baumartenampel

Tree species traffic light system

https://www.klimafitterwald.at/baumarten/

Other Decision Support Systems from BFW

Provenance recommendation system for Austria (to be replaced by Seed4forest)

https://bfw.ac.at/hkd/herkauswahl.einstieg