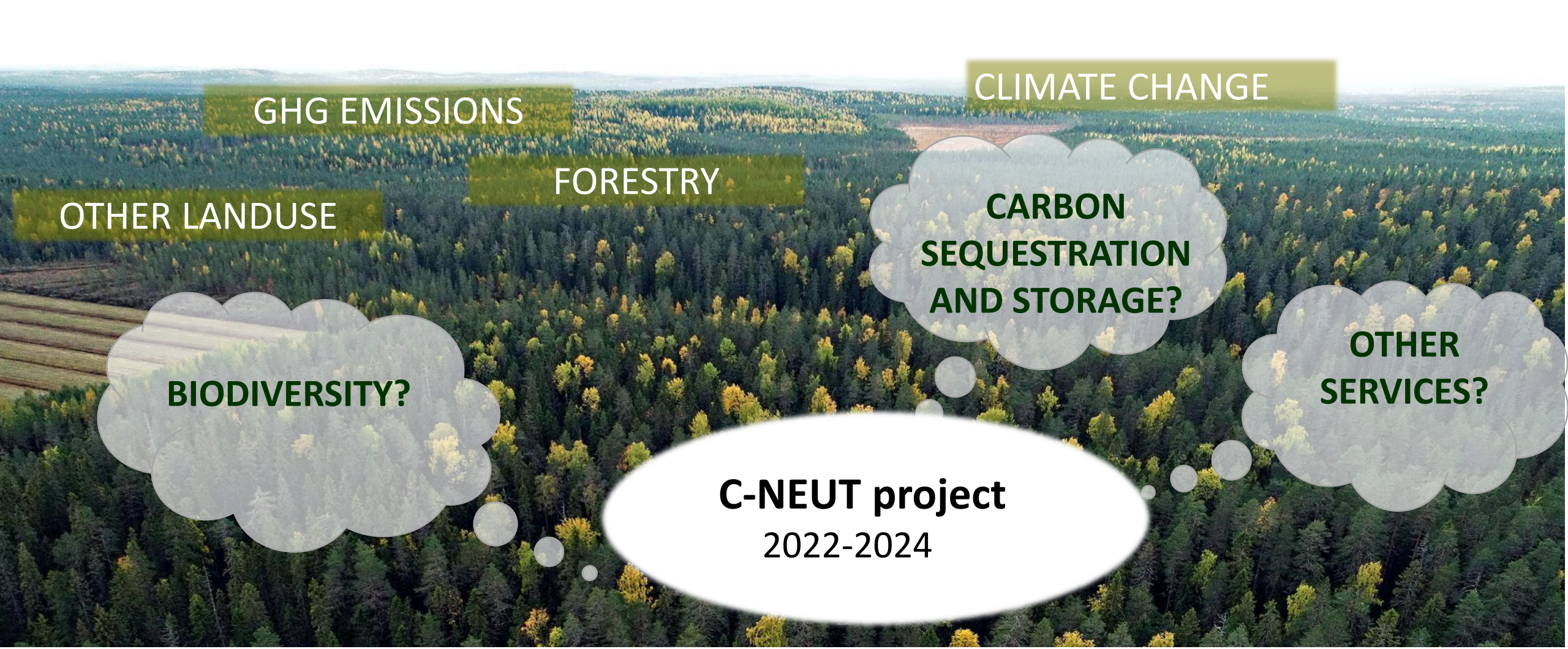

Evaluating spatially explicit carbon-neutrality for boreal landscapes and regions

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Funded by the European Union
NextGenerationEU

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C-NEUT: Background & goals

- Climate Act: Finland carbon neutral by year 2035 after which greenhouse gas (GHG) emissions should be negative.
  - The landuse sector (LULUCF) was for the first time a GHG emission source in 2021 in Finland.
  - Growth of forests is decreasing.
- Climate change affects GHG processes and resilience of forests.
- The challenges posed by climate change, biodiversity loss and harmful land-use are deeply interconnected and vary across Finland
  - Spatially explicit information on the potential for reaching carbon-neutrality in boreal landscapes and regions needed

→ Spatially explicit net GHG budgets for different scenario combinations.

→ Integrated evaluation of targets → optimal/win-win solutions.

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Net GHG emissions by land cover type, current situation

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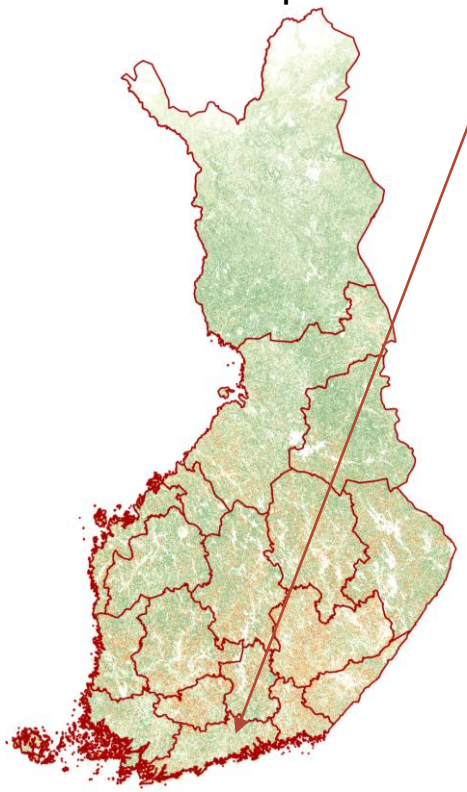
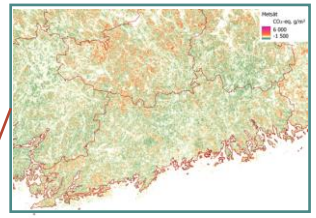
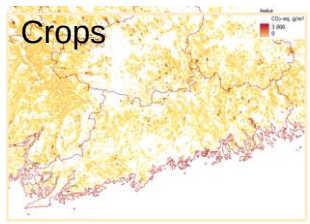
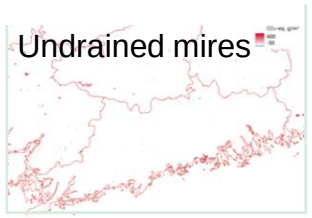
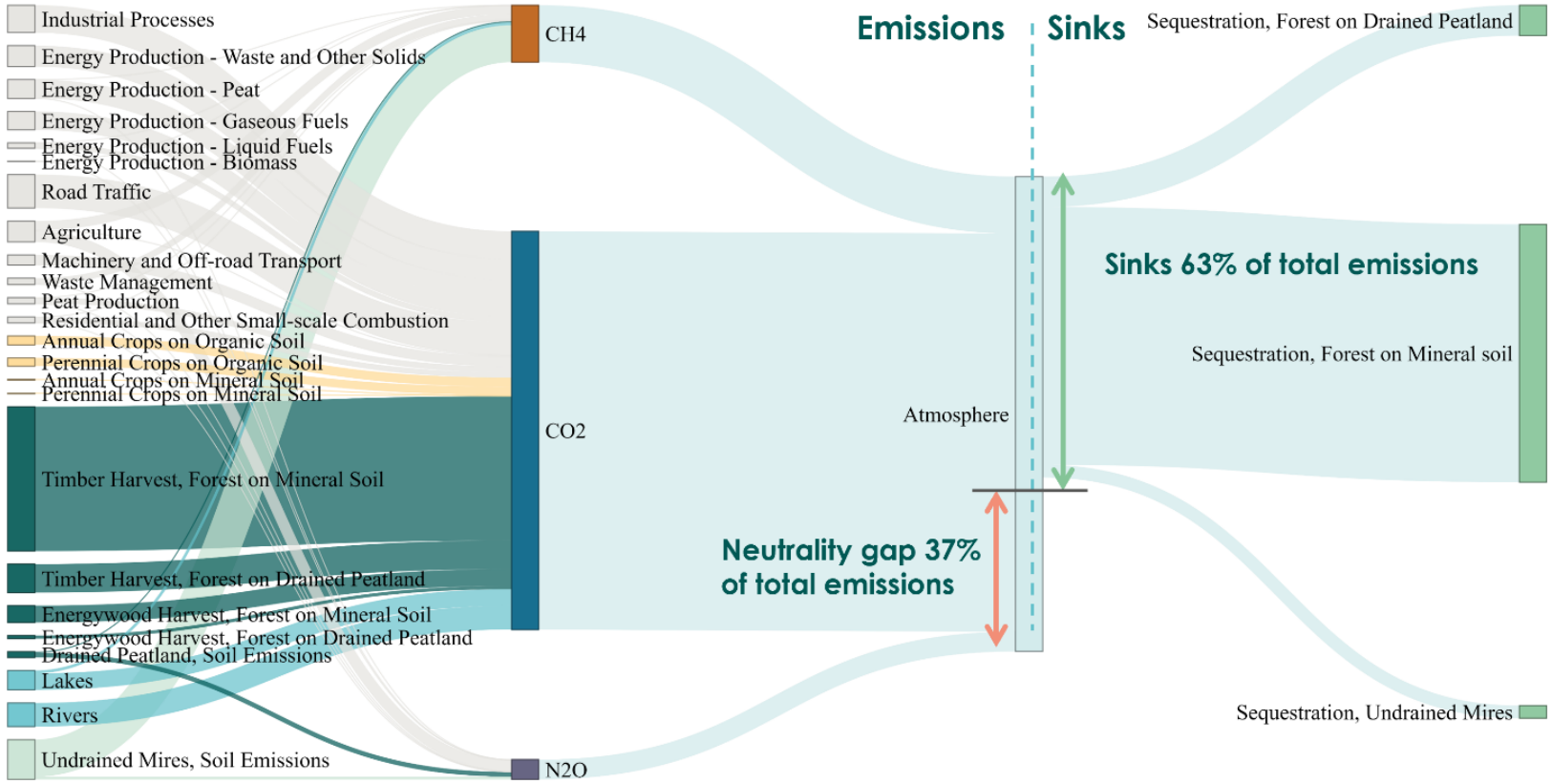
Forest net emissions on map:











All results available for each region!

Holmberg et al. 2023
https://doi.org/10.1007/s13280-023-01910-8

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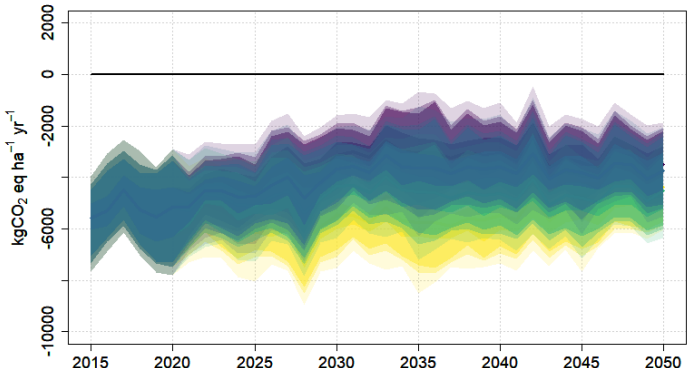
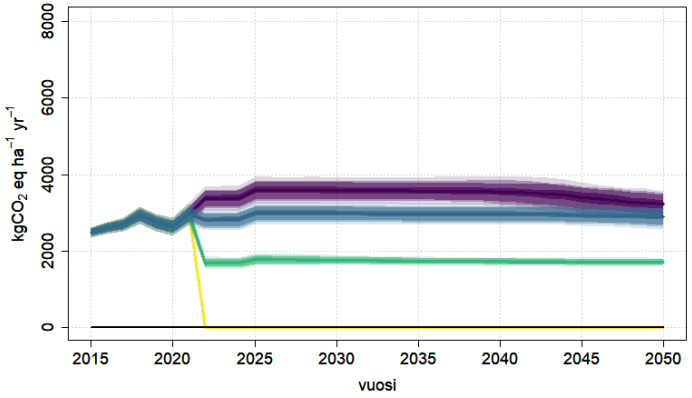
Scenarios for forests with uncertainties

Harvest and climate scenarios until year 2050





Net ecosystem exchange (with RCPs 2.6, 4.5 and 8.5)

\+

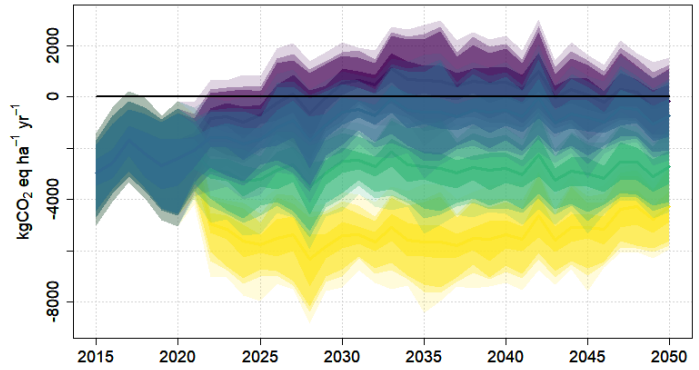
Biomass removal by harvests (harvest scenarios)

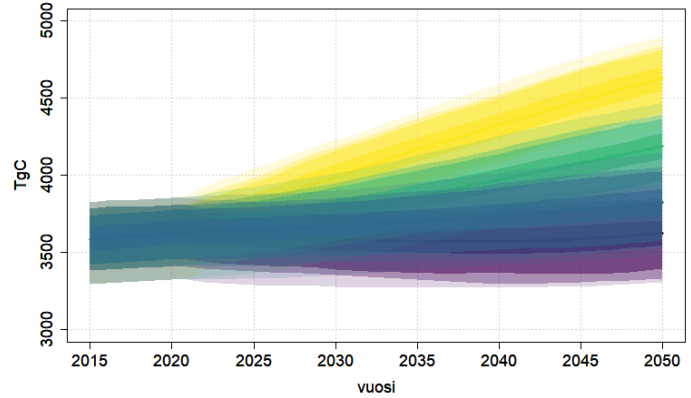
=

Net biome exchange

→

Forest ecosystem carbon stock





More intensive harvests
Current level of harvests
Less intensive harvests
No harvests

Scenarios available for each region!
Model development for wind, fire and bark beetle disturbances going on!

Junttila ym. 2023 (*Ambio*), Forsius ym. 2023 (*Ambio*)

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Main results and conclusions

Project results

- Detailed, spatially explicit information on GHG budgets for implementing regional protection and climate roadmaps
- Results documented in many publications and freely available datasets

Conclusions

- Reaching both the national and most regional carbon neutrality targets by 2035 assuming current forest harvesting levels is challenging.
- Integrated evaluation of biodiversity and climate targets enables development of cost-efficient measures.
- Carbon sequestration of forests enhanced with climate change, but uncertainties caused by disturbances increase also.

Future

- Aim to continue developing co-operation with regional actors
- Continue to develop uncertainty modelling and assessment

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