The ForestNavigator Project

Forest policy modelling toolbox advancements

Fulvio Di Fulvio & Mykola Gusti

Contributors: Andrey Lessa Augustynczik, Petr Havlik
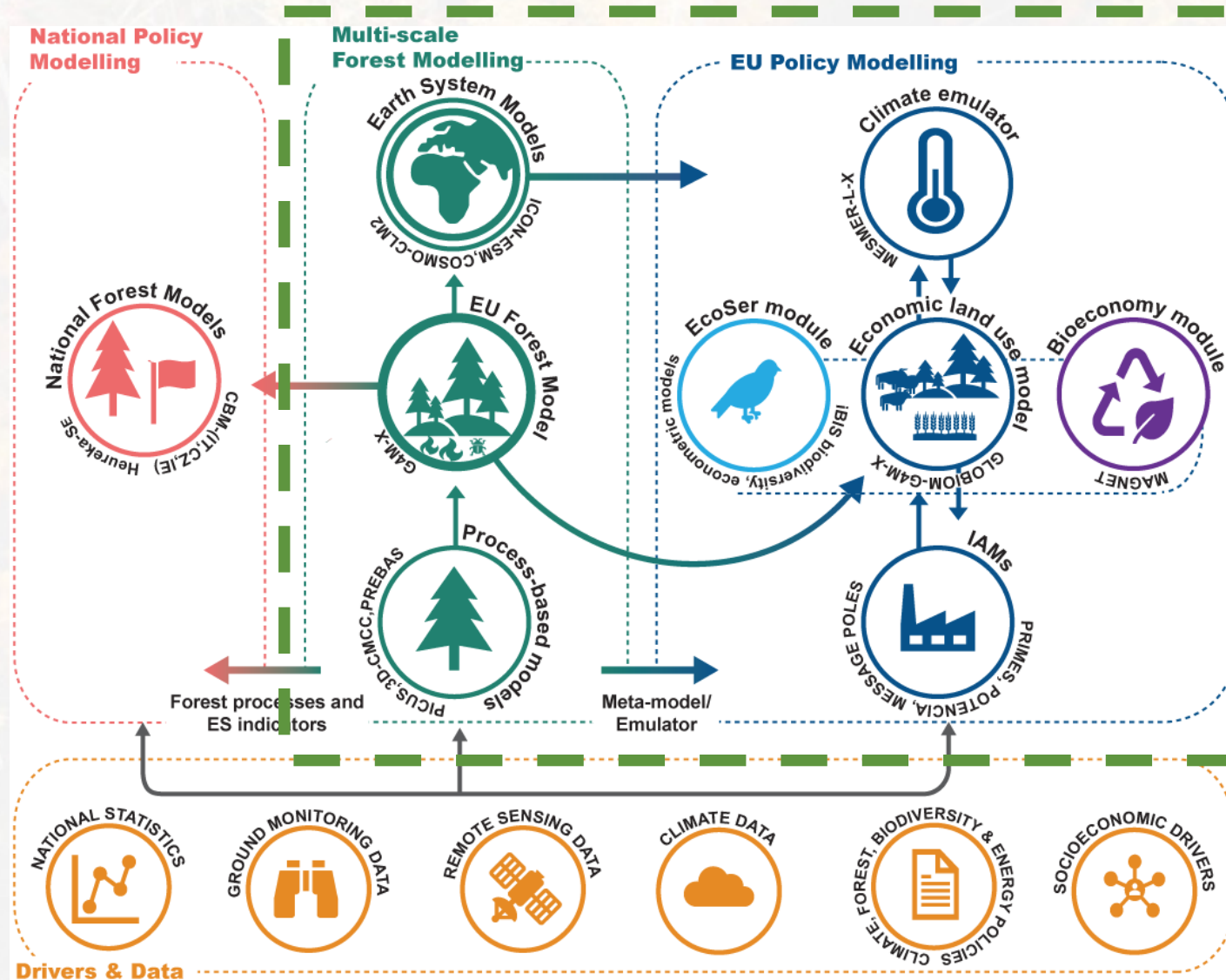and the IIASA ForestNavigator Team

IIASA
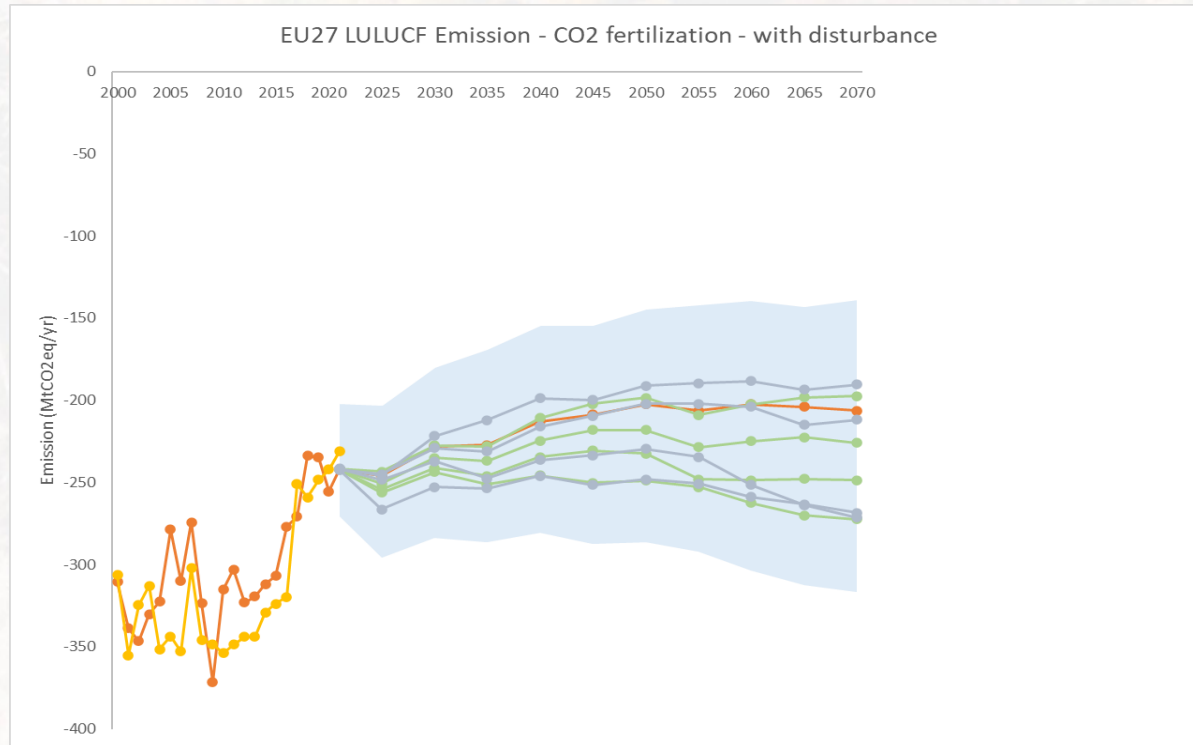
Analytic Modelling Framework

Process-based modelling of CC impacts and disturbances in the EU forest policy modelling toolbox
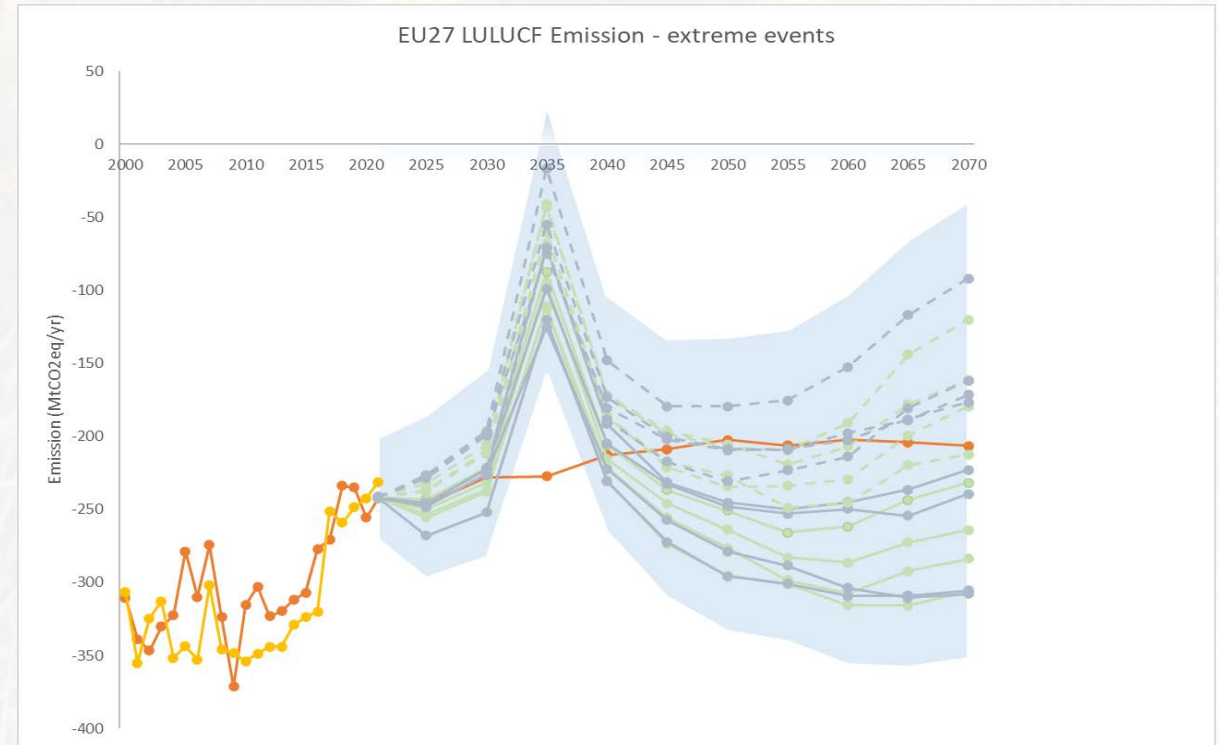
Natural conditions and mitigation pathways

Impact of climate change and natural disturbances

Impact of climate change and extreme events on forest sink

EU27 LULUCF Emission - CO2 fertilization - with disturbance

EU27 LULUCF Emission - extreme events

COMMISSION STAFF WORKING DOCUMENT
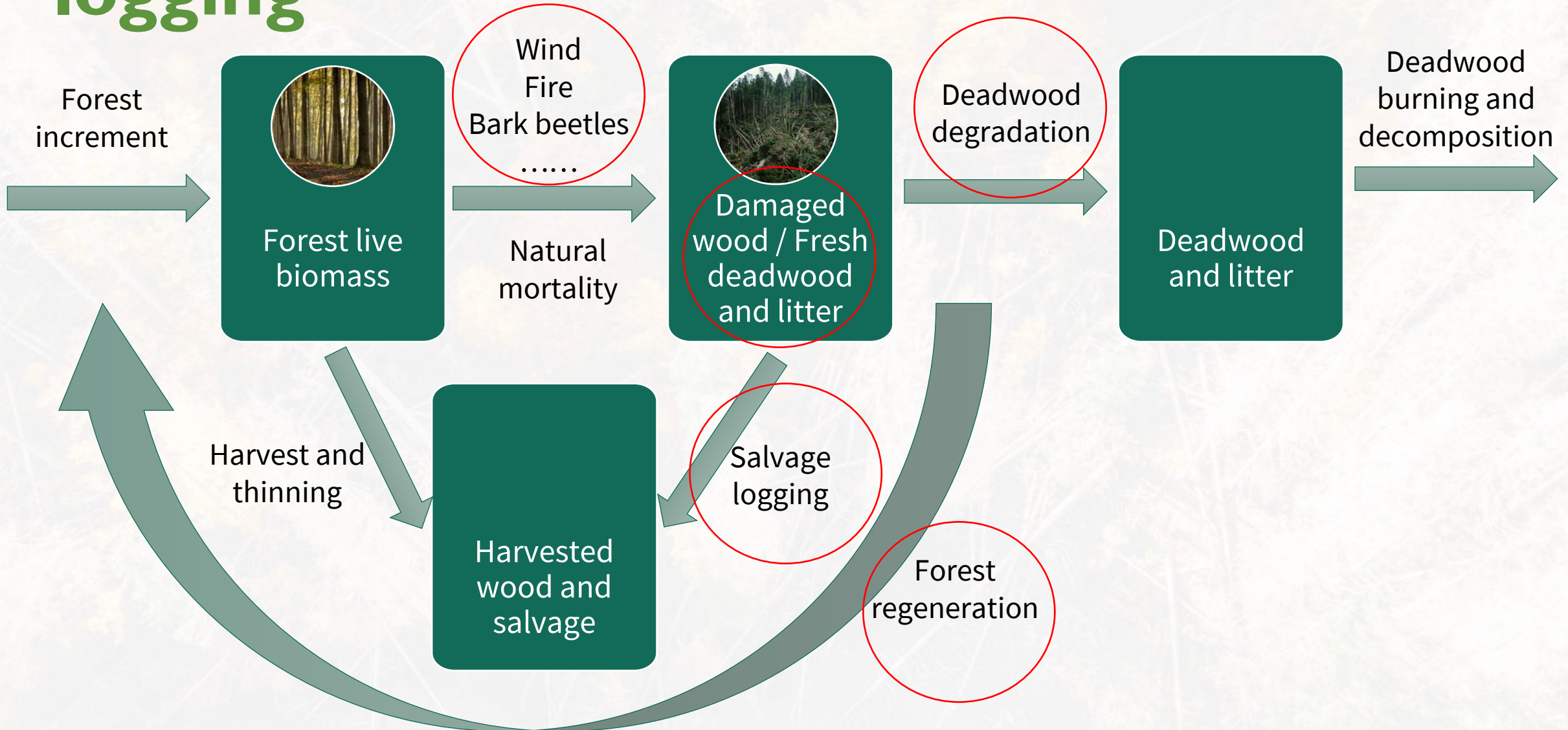
IMPACT ASSESSMENT REPORT

Modelling framework
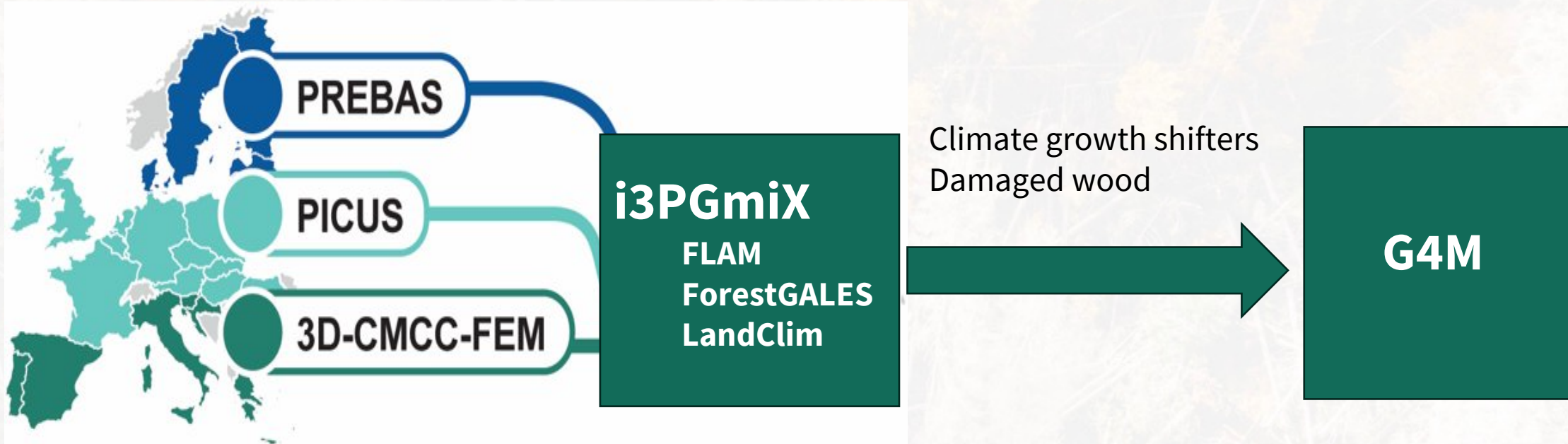
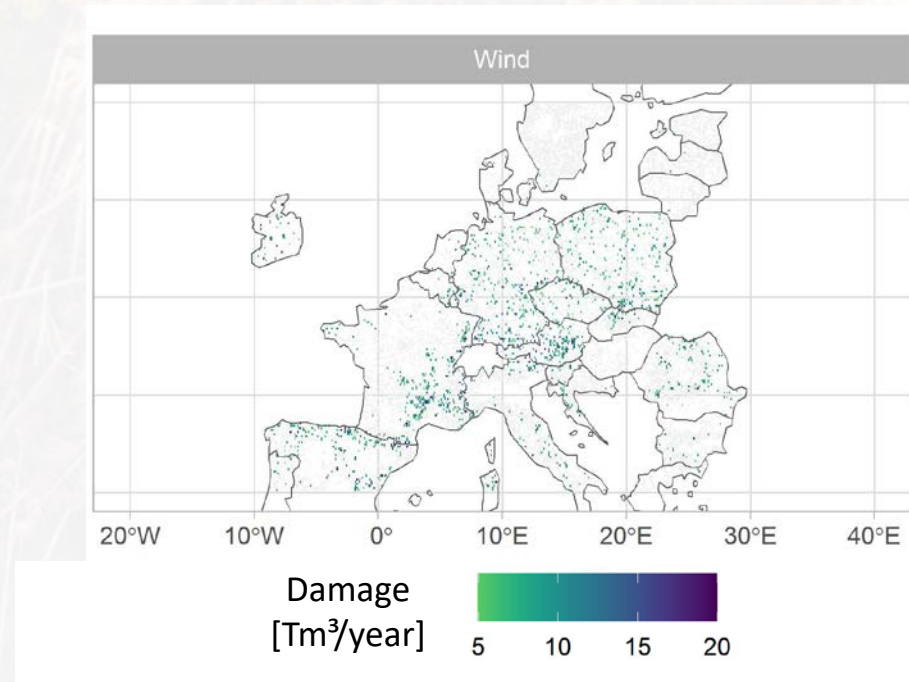# Disturbances, deadwood and salvage logging

Disturbances, deadwood and salvage logging

Proof of concept

- Disturbances
  - Expected damage from wind and bark beetle (with and without salvage logging)
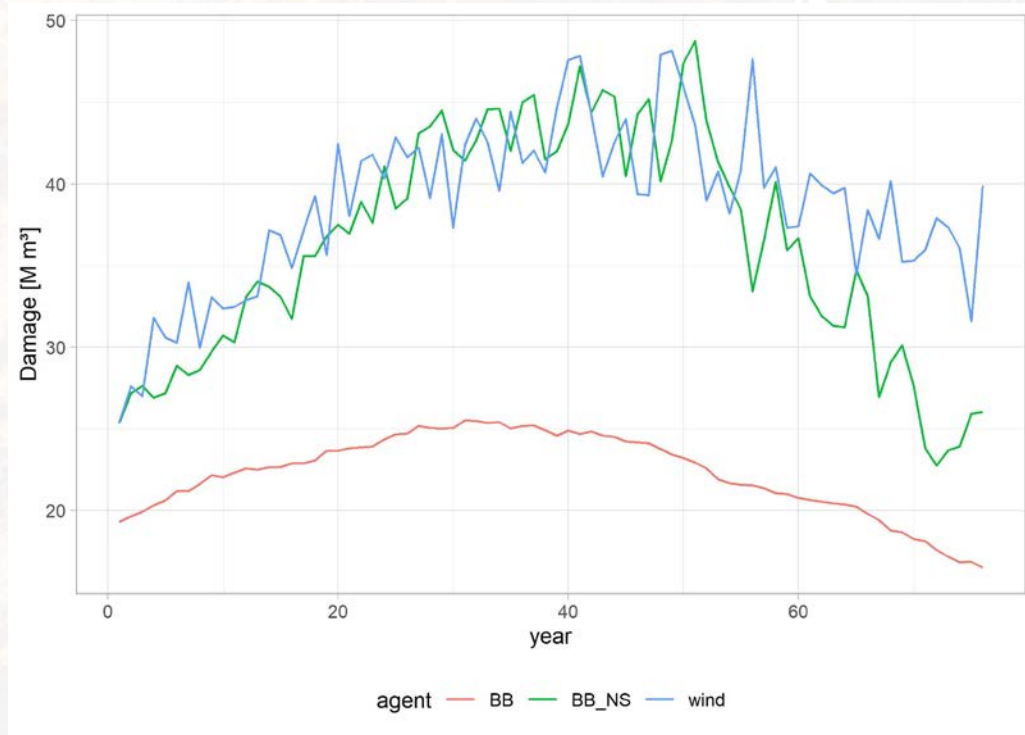
Salvage logging and CO$_2$ emissions

- Capacity to do salvage logging – removals increases 1.5 - 2 times

- Uncertainty in the harvestable share of damaged wood:
  - Wind – 0.86 [0.55 - 0.95]
  - Biotic – 0.72 [0.2 – 0.95]
  - Fire – 0.5 [0.2 – 0.5]

- Long legacy effect on age structure and future harvest

- Need for proper accounting of living biomass, deadwood, litter (soil) and HWP pools

Wood removals, m^3

Biomass and Deadwood emissions, MtCO$_2$/y

Forest Policy Modelling Toolbox

Aligning EU and National policy modelling
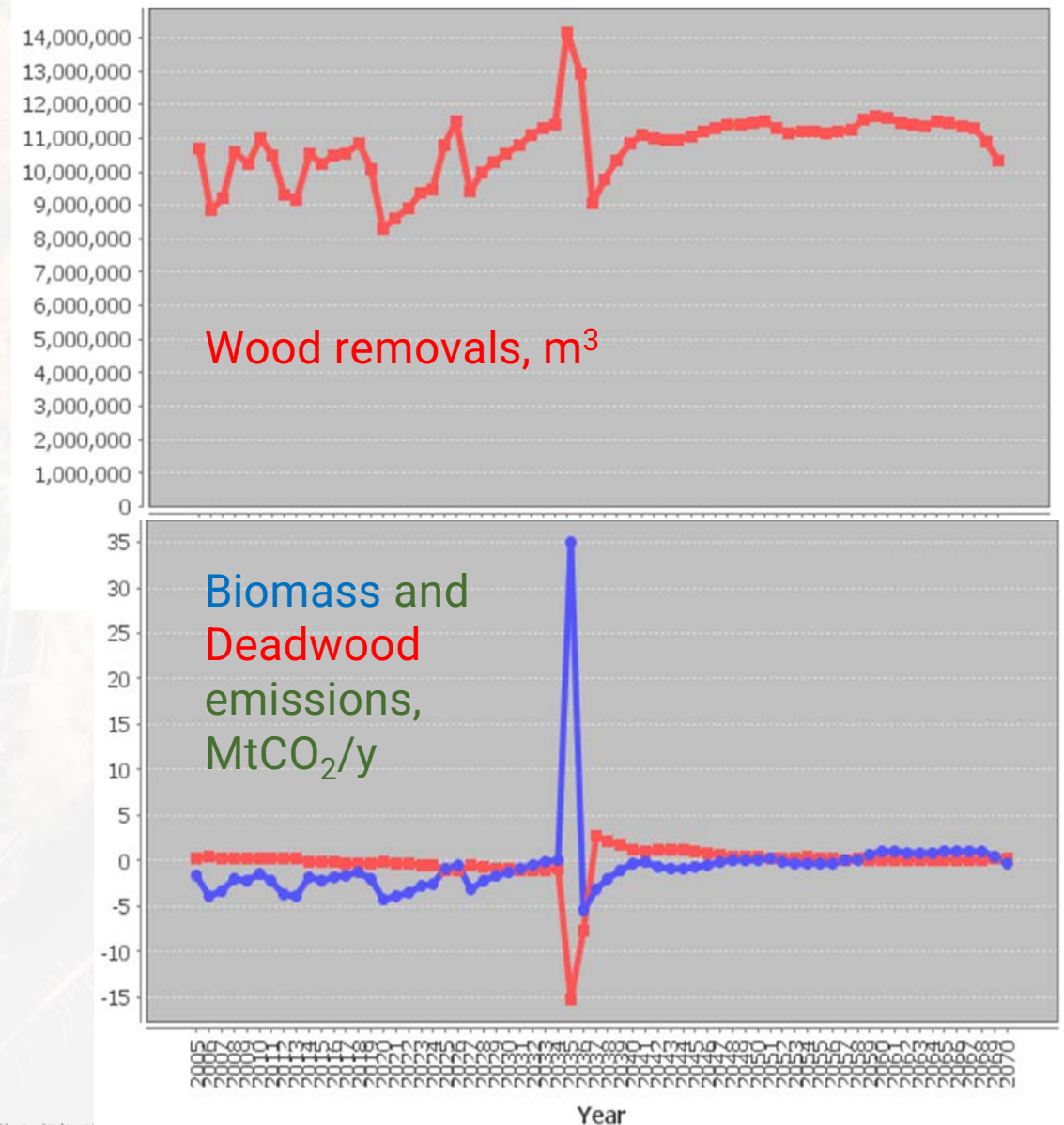
Framework and protocols for consistent alignment of models:

Protocols:
- Input/Output/Scenarios

Modelling Framework:
- Harvest
- HWP
- Afforestation area
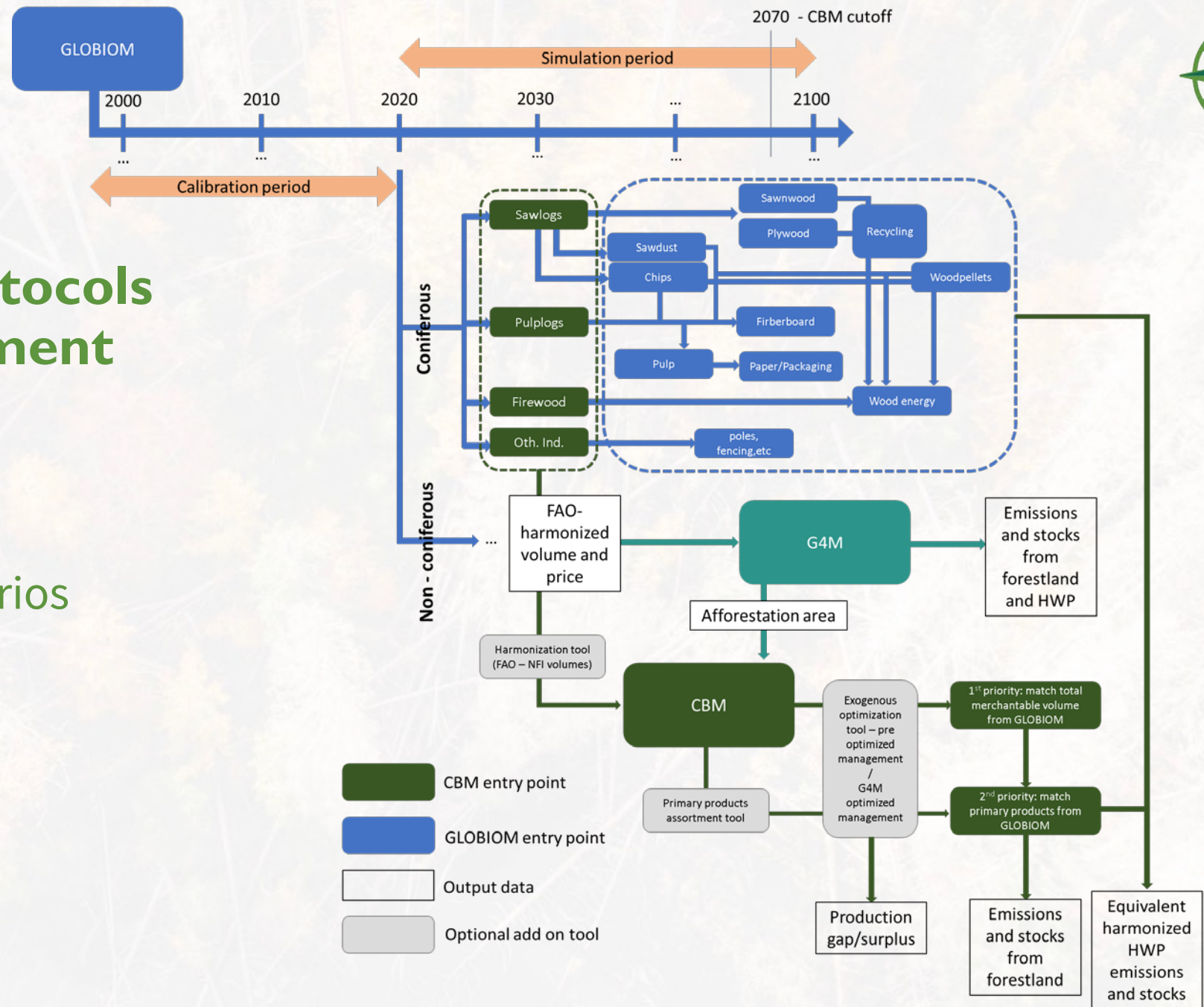
EU Forest Policy Modelling Forum

A Forum to shorten the policy cycle and align EU & national pathways
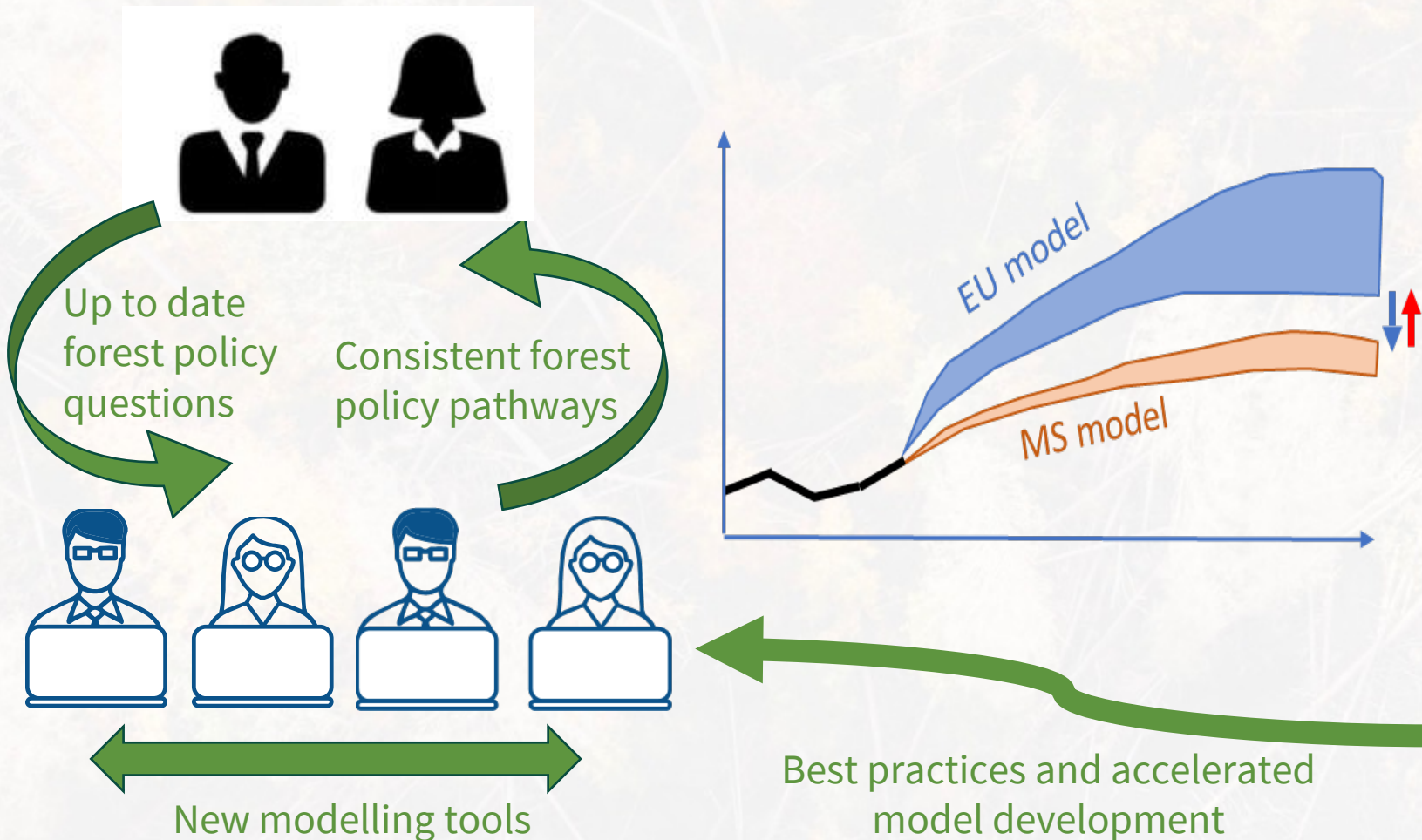
ForestNavigator Portal
- Open access to harmonized data
- Consistent model development
- Automatized model deployment and results visualization

Up to date forest policy questions

Consistent forest policy pathways

EU model

MS model

New modelling tools

Best practices and accelerated model development

Exchange on modelling methods and results
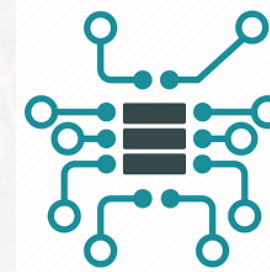
The ForestNavigator Portal: platform at service of researches
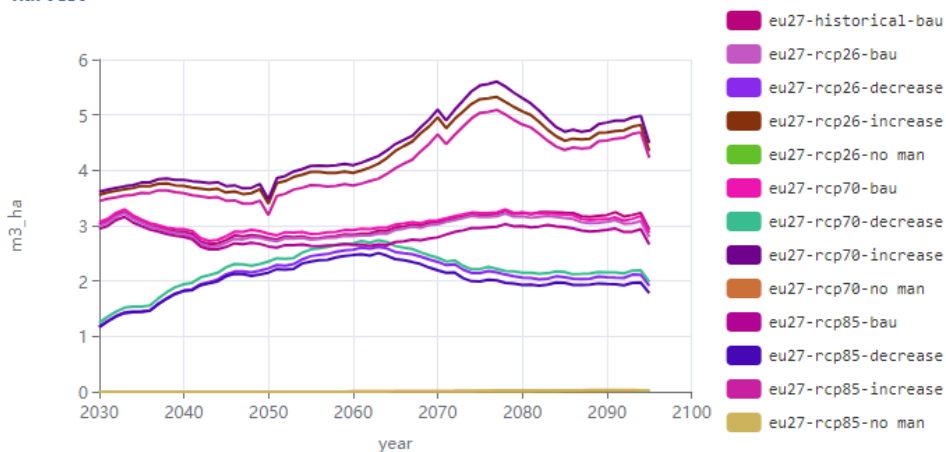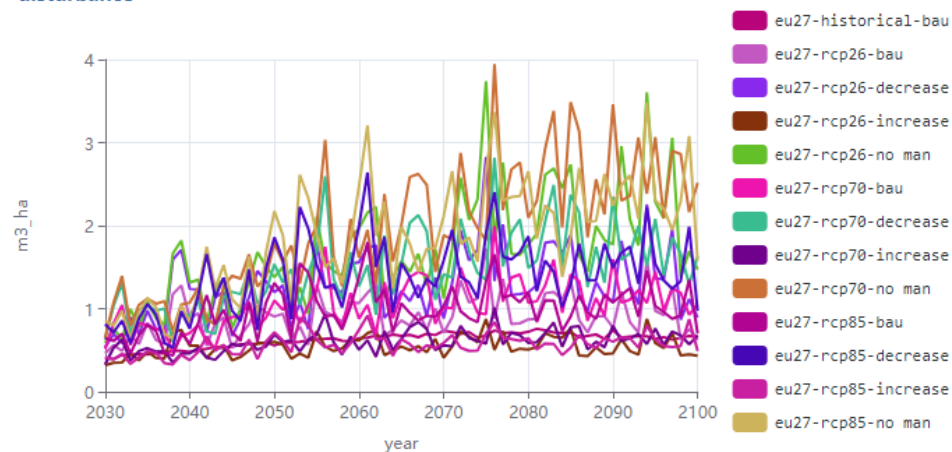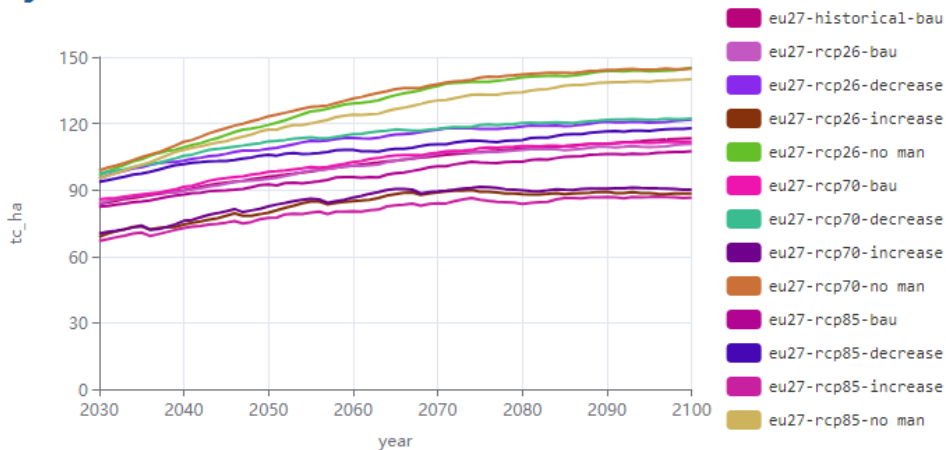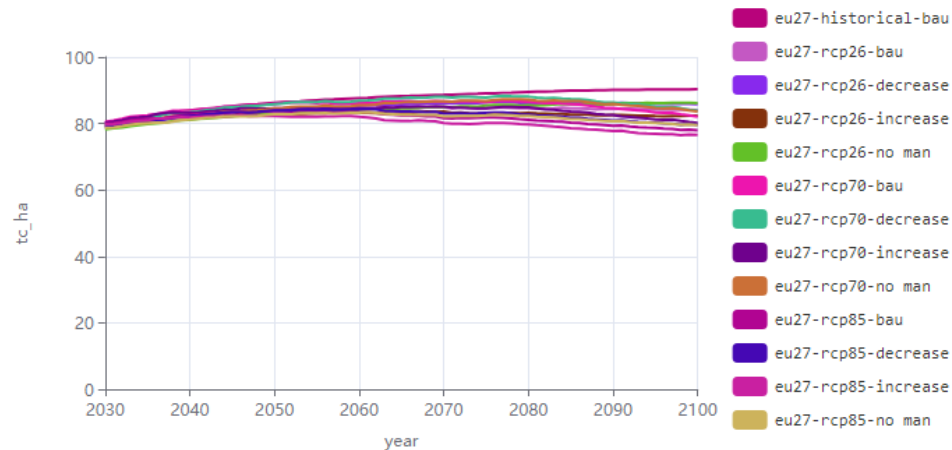
FPMF upcoming first official meeting: Brussel, September 18-19th

	18th September	19th September
Morning	**Policy relevance of the FPMF** • Introduction to FPMF • Update on recent EU/National/International policies targets and their assessment status	**Modelling intercomparison and policy scenarios design:** • Presentation of modelling protocol • Early results from preliminary scenarios with intercomparison between EU/National models • Reflect with policy makers on preliminary scenarios outcome • Co-design with policy makers future scenarios to be assessed
Afternoon	**National and EU models recent assessments and results:** • Recent assessments/results from EU/National models incl. new modelling functionalities	**Next steps:** • Discussion with the modelers about next steps for implementing scenarios and model functionalities to be developed

Thank you for your attention

Questions?

- LinkedIn @Forest NavigatorEU
- X: @ForestNavigEU
- Email: forestnavigator.info@iiasa.ac.at
- Website: https://www.forestnavigator.eu/

Disturbances and damaged wood

Windthrows

- ForestGALES with default parametrization
- Weather: wind speed and direction
- Site: soil type
- Forest: species, DBH, height, crown length, spacing

Bark beetles

- Based on LandClim with the additions from Marie et al. (2023)
- Weather: temperature, precipitations, seasonal patterns
- Site: soil type
- Forest: species composition, age, DBH, stress, density and spatial distribution

Fire

- FLAM model
- Weather: wind speed and direction, temperature, precipitations, relative humidity, seasonal patterns
- Site: altitude, slope, aspect
- Forest: fuel type, fuel load, fuel moisture content, fuel continuity,….

Simulation protocol for model simulations intercomparison

- List of defined input-output

1	Experiments	Contains the template describing the experiments, which will be conductted by the modelling teams, including the definition of scenarios and drivers
2	Input_site	Contains the template of the site characteristics used by the models, including soil fertility and water conditions
3	Input_climate	Contains the template of the input climate data used by the models, where applicable
4	Input_area	Contains the template of the forest areas used in each model, as well as information on afforestation and deforestation
5	Input_harvesting	Contains the template of the harvesting levels in each country used as input to the models
6	Input_disturbances	Contains the template of the natural disturbance levels and salvage logging in each country used as input to the models
7	Input_management	Contains the template of the silvicultural operations implemented for each forest type and management scenario
8	Output	Contains the output template to collect modelling results
9	Simulation_catalog	Catalog of the existing simulation runs from the different modelling teams

- Input template

Model	Scenario	Region	Type	Species class	Item	Units	Year
G4M	SSP1-RCP2.6_BAU	AT	Thinning	Broadleaf	Fuelwood	million m3	2015
G4M	SSP1-RCP2.6_BAU	AT	Final harvesting	Broadleaf	Sawlogs	million m3	2015
G4M	SSP1-RCP2.6_BAU	AT	Final harvesting	Broadleaf	Fuelwood	million m3	2015
G4M	SSP1-RCP2.6_BAU	AT	Final harvesting	All	Pulpwood	million m3	2015
G4M	SSP1-RCP2.6_BAU	AT	Thinning	Coniferous	Fuelwood	million m3	2015
G4M	SSP1-RCP2.6_BAU	AT	Final harvesting	Coniferous	Sawlogs	million m3	2015
...	...	...	...	...	...	...	...

- Output template

Output variables	Description	Units
Area | Disturbances | Biotic	Area of biotic disturbances	ha
Area | Disturbances | Fire	Area of wildfire disturbances	ha
Area | Disturbances | Wind	Area of windtrhow disturbances	ha
Area | Forest	Area of forest remaining forest	ha
Area | Soils | Mineral	Area of mineral soils	ha
Area | Soils | Organic	Area of organic soils	ha
Emission | Soils	Total soil emissions	mtCO2/year
Emissions | Disturbances	Emissions from natural disturbances	mtCO2/year
Emissions | Disturbances | Biotic	Emissions from biotic agents	mtCO2/year
Emissions | Disturbances | Fire	Emissions from wildfires	mtCO2/year
Emissions | Disturbances | Wind	Emissions from windthrows	mtCO2/year
Emissions | Forest | Deadwood	Emissions from deadwood decomposition	mtCO2/year
Emissions | Forest | Harvest	Emissions from forest harvesting	mtCO2/year
Emissions | Forest | Litter	Emissions from litter decomposition	mtCO2/year
Emissions | Forest | Living biomass	Emissions from living biomass	mtCO2/year
Emissions | Products | Other	Emissions from other wood products	mtCO2/year
Emissions | Products | Other solid	Emissions from other solid wood	mtCO2/year
Emissions | Products | Panels	Emissions from wood pannels	mtCO2/year
Emissions | Products | Paper and paperboar	Emissions from paper and paperboard	mtCO2/year
Emissions | Products | Sawnwood	Emissions from sawnwood	mtCO2/year
Emissions | Soils | Mineral	Emissions in mineral soils	mtCO2/year
Emissions | Soils | Organic	Emissions in organic soils	mtCO2/year
Emissions | Soils | Organic | Rewetted	Emissions in rewetted organic soils	mtCO2/year
Emissions | Soils | Organic| Drained	Emissions in drained organic soils	mtCO2/year
Emissions| Forest	Total emissions from the vegetation	mtCO2/year
Emissions | Afforestation	Emissions from afforestation	mtCO2/year
Emissions | Deforestation	Emissions from deforestation	mtCO2/year
Production | Forest | CAI	Current annual increment	m³/ha/year
Production | Forest | MAI	Mean annual increment	m³/ha/year
Removals | Disturbances	Total damaged volume	m³
Removals | Disturbances | Fuelwood	Fuelwood harvest volume	m³
Removals | Disturbances | Pulplogs	Pulplog harvest volume	m³
Removals | Disturbances | Sawlogs	Sawlog harvest volume	m³
Removals | Harvest	Total harvest volume	m³
Removals | Harvest | Fuelwood	Fuelwood harvest volume	m³
Removals | Harvest | Pulplogs	Pulplog harvest volume	m³
Removals | Harvest | Sawlogs	Sawlog harvest volume	m³