



Innovative forest management strategies for a resilient bioeconomy under climate change and disturbances

Vallet P., **Reyer CPO**, Aussenac R., Beauchamp N., Cerioni M., Courbaud B., Fidej G., Grabska E., Guyennon A., Gutsch M., Hawryło P., Keren S., Klopčič M., Labonne S., Lindner M., Mahnken M., Monnet J.-M., Nagel T., Netzel P., Nikinmaa L., Patacca M., Reineking B., Schelhaas M.J., Schifferdecker G., Socha J., Tyimińska L., Zudin S., Cordonnier T.

Berlin, 1-2.10.2024, From WoodWisdom-Net to ForestValue: 20 years pioneering progress in European Forestry & Wood Tech

ForestValue2



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May 2019 → October 2022

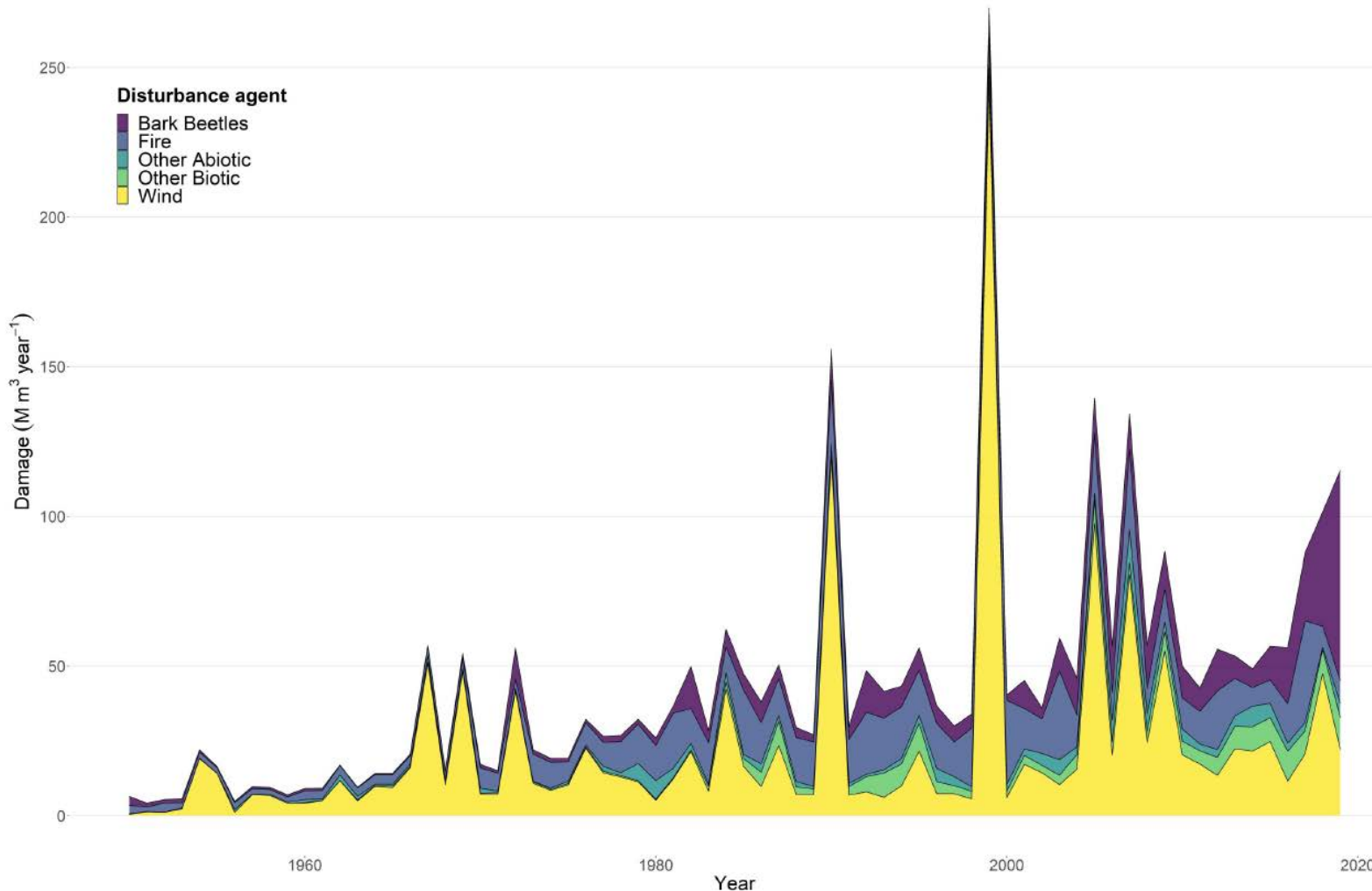




Main aim of I-Maestro:

to improve the scientific basis for developing management strategies that increase forest resilience to future natural disturbances and climate change

Database of Forest Disturbances in Europe (DFDE)



- >170,000 records of ground-based natural disturbance observations in European forests from 1950 to 2019
- average of 43.8 million m³ of disturbed timber volume per year
- wind = 46%
- fire = 24%
- bark beetles = 17% (doubled share over past 20 years)

What is complexity in I-Maestro ?

Stand scale

Alpha diversity



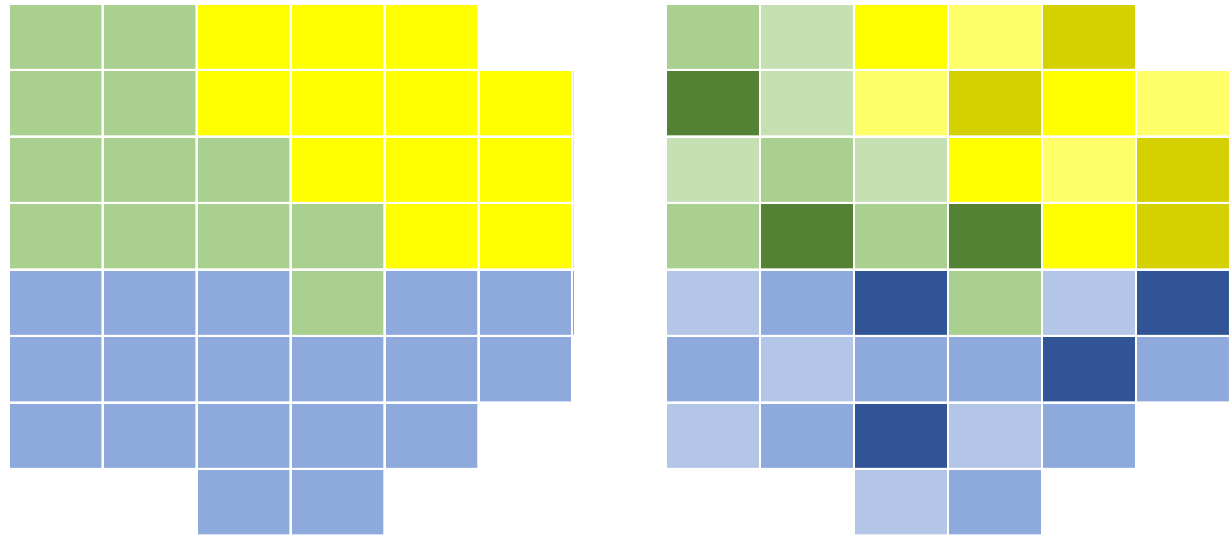
Few species
Simple diameter
structure



Many species
Complex diameter
structure

Landscape scale

Beta diversity



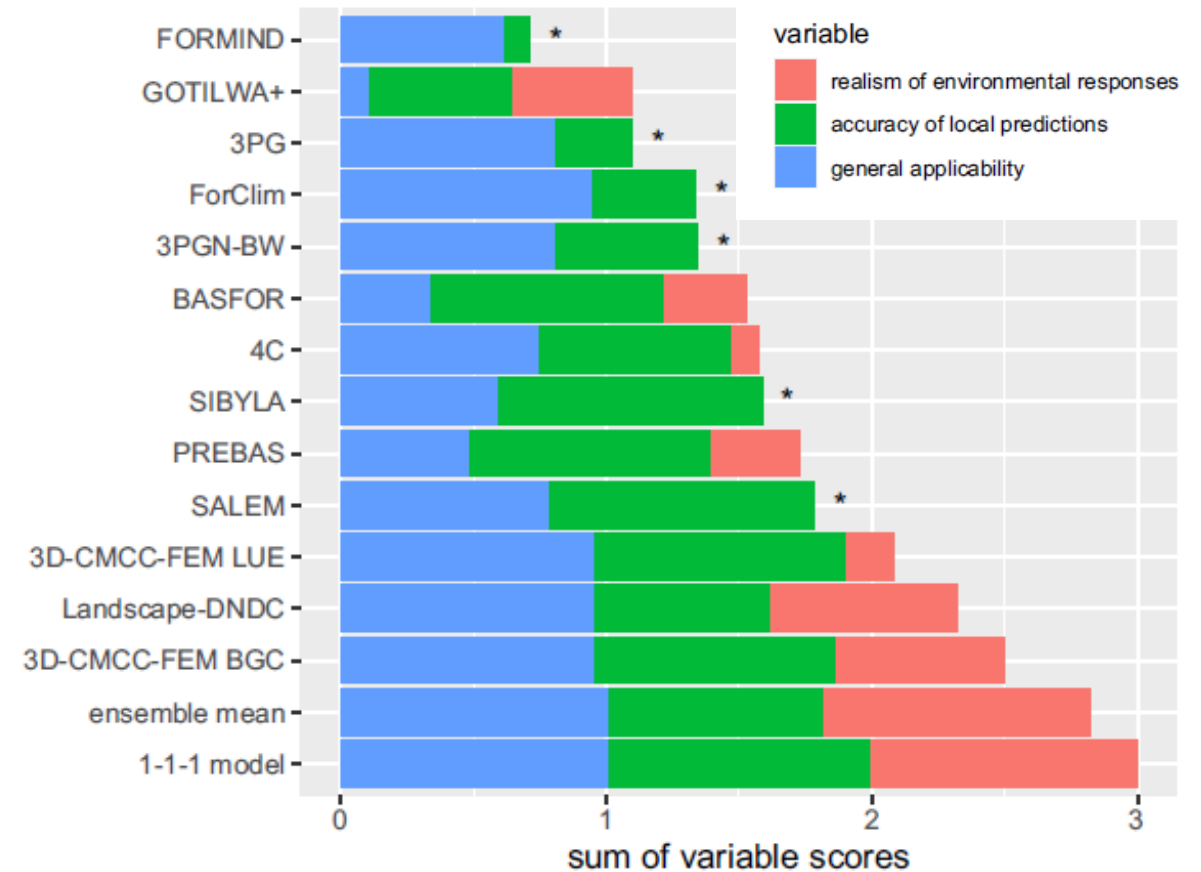
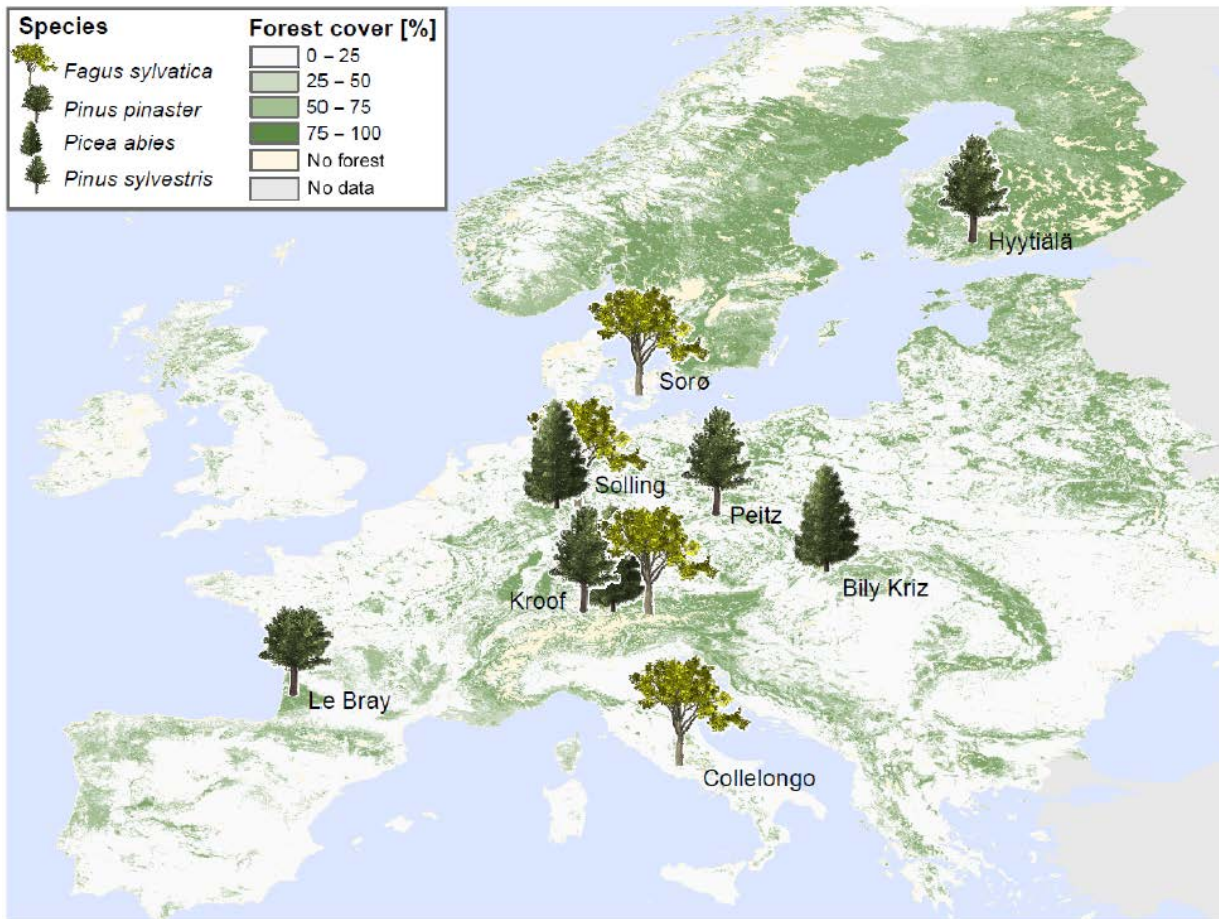
Low variety
of stands



High variety
of stands

In forests, time is long → modelling approach

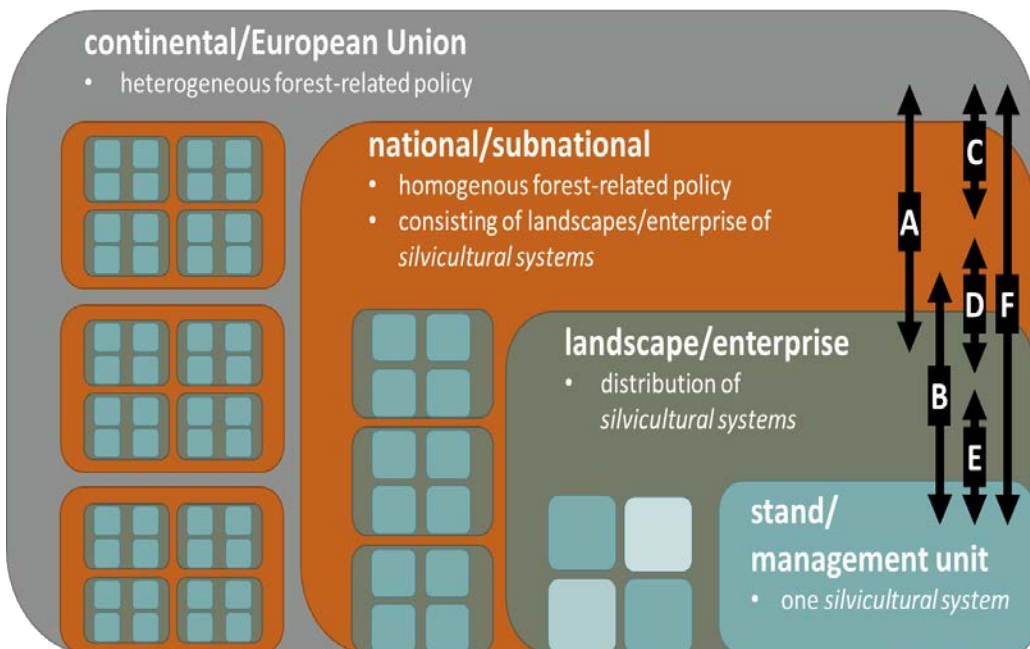
Multi-model evaluation



Reyer et al. 2020 ESSD,
<https://doi.org/10.5194/essd-12-1295-2020>

Mahnken et al. 2022 GCB,
<https://doi.org/10.1111/gcb.16384>

Forest Management Scenarios across Europe

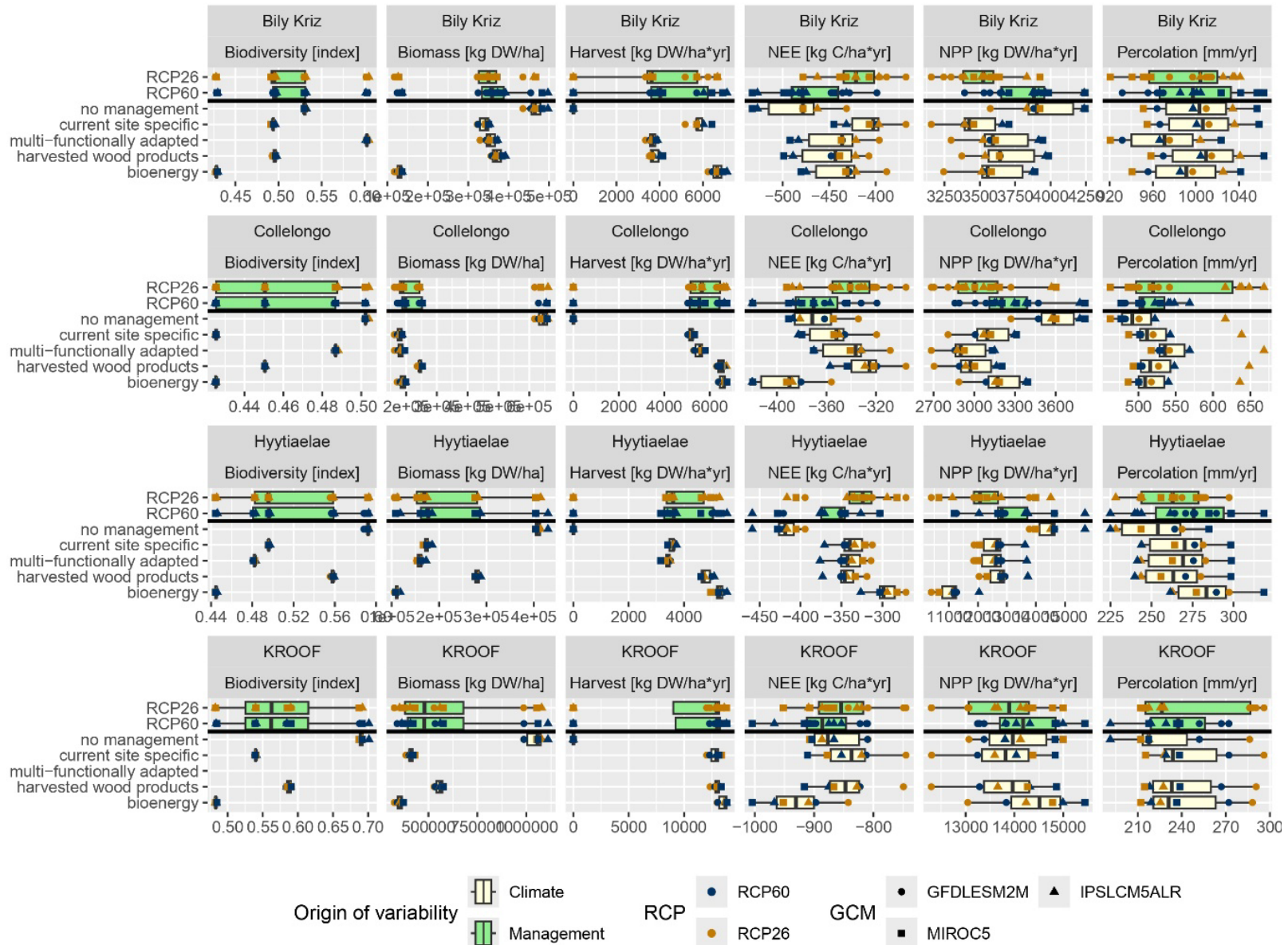


	Baseline	Alternative			
		Extensive	Intensive		
Stand	Baseline	No management	Multi-functionally adapted	Harvested wood products	Bioenergy
	Baseline	Extensification	Spatial trade-off 1	Spatial trade-off 2	Intensification
Landscape	Baseline, working for complexity	Extensification, working for complexity	Spatial trade-off 1, working for complexity	Spatial trade-off 2, working for complexity	Intensification, working for complexity
	Baseline, no conversion	Natural, no conversion	Quality, no conversion	Intensified, no conversion	Industrial, no conversion
National	Baseline, slow conversion	Natural, slow conversion	Quality, slow conversion	Intensified, slow conversion	Industrial, slow conversion
	Baseline, fast conversion	Natural, fast conversion	Quality, fast conversion	Intensified, fast conversion	Industrial, fast conversion

Management vs. climate effects at stand scale

Stand scale

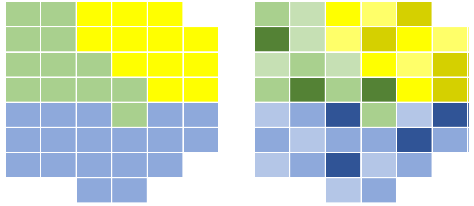
Alpha diversity



Simulation of forest dynamics in 3 case study areas

Landscape scale

Beta diversity



Bauges (France) :

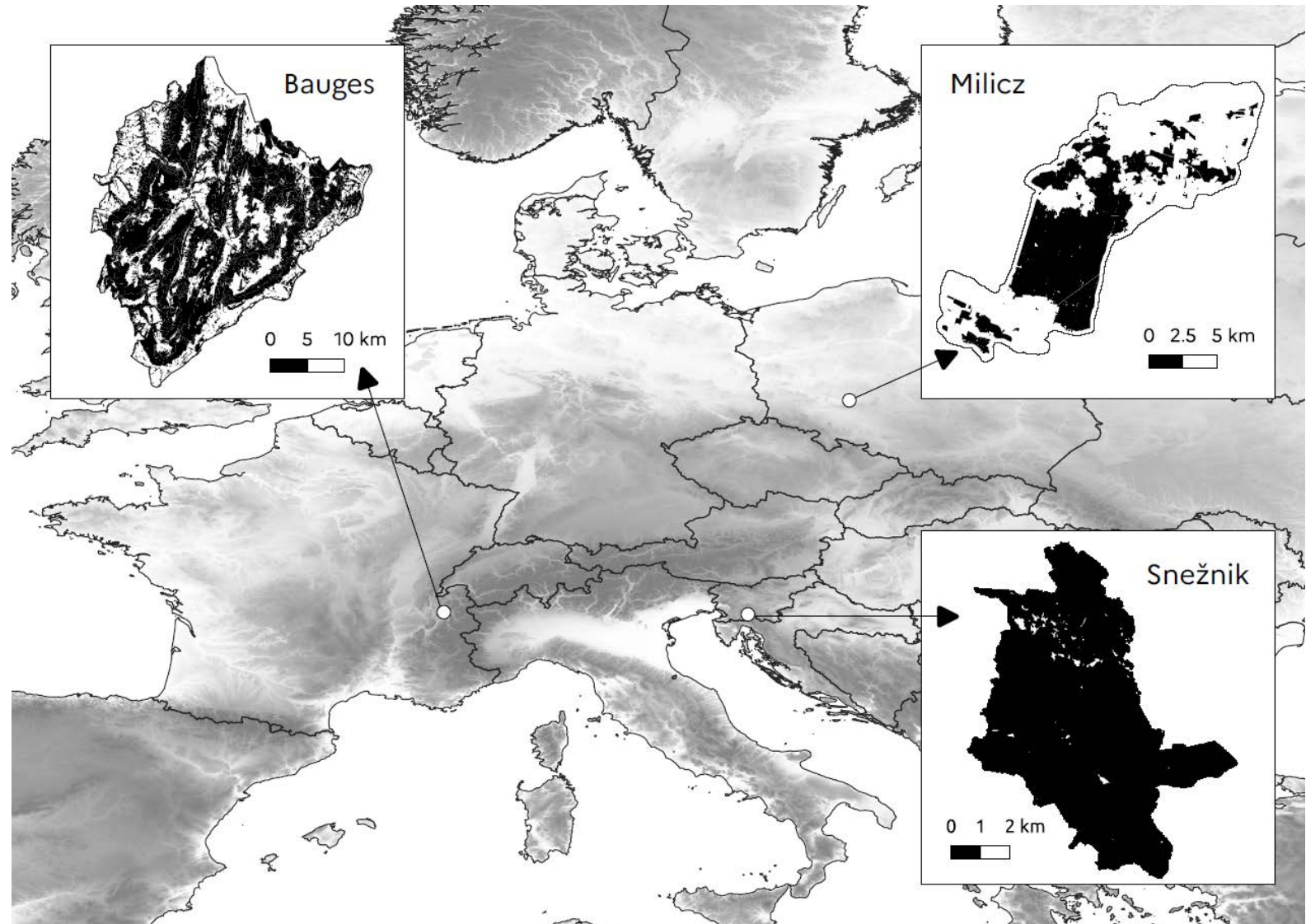
~ 51 500 ha, mountain forest

Milicz (Poland) :

~ 7 700 ha, plain forest

Sneznik (Slovenia) :

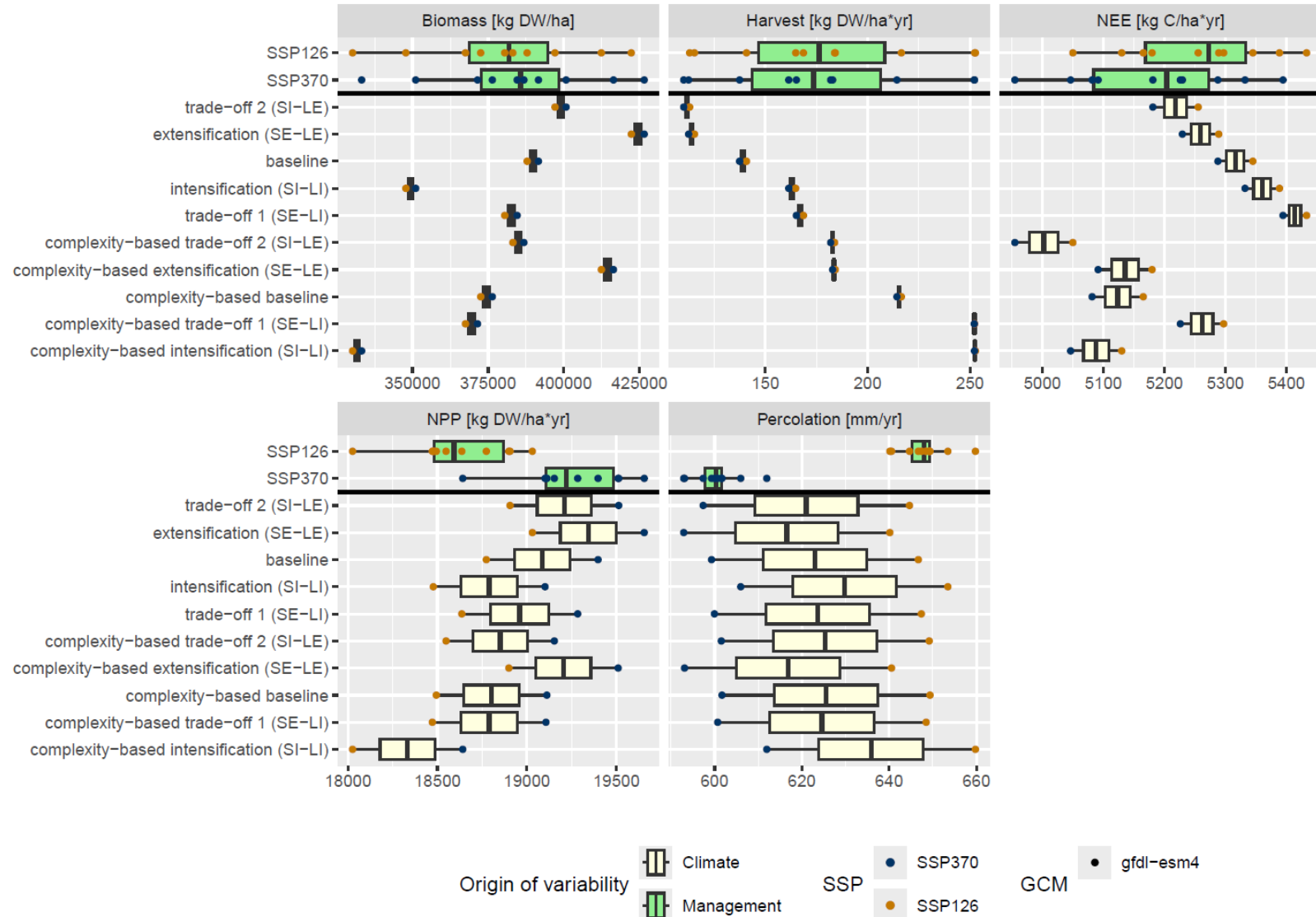
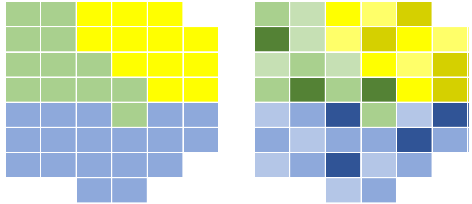
~ 4 600 ha, mountain forest



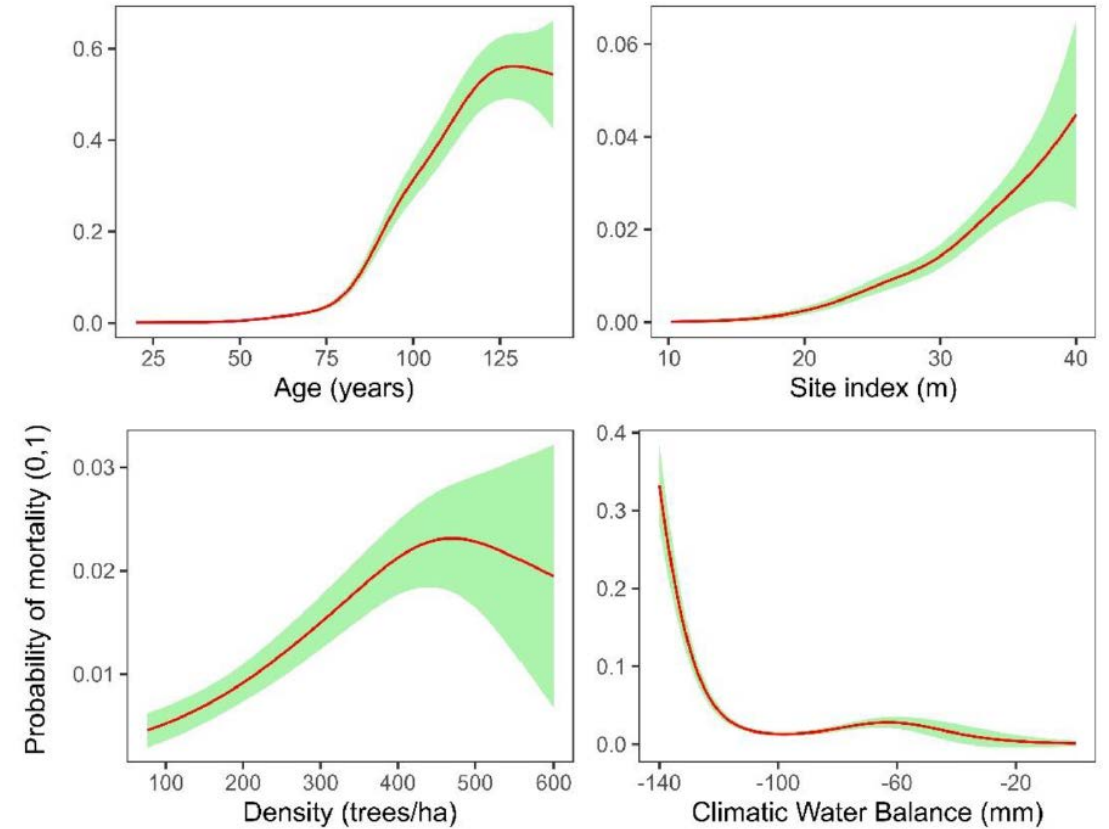
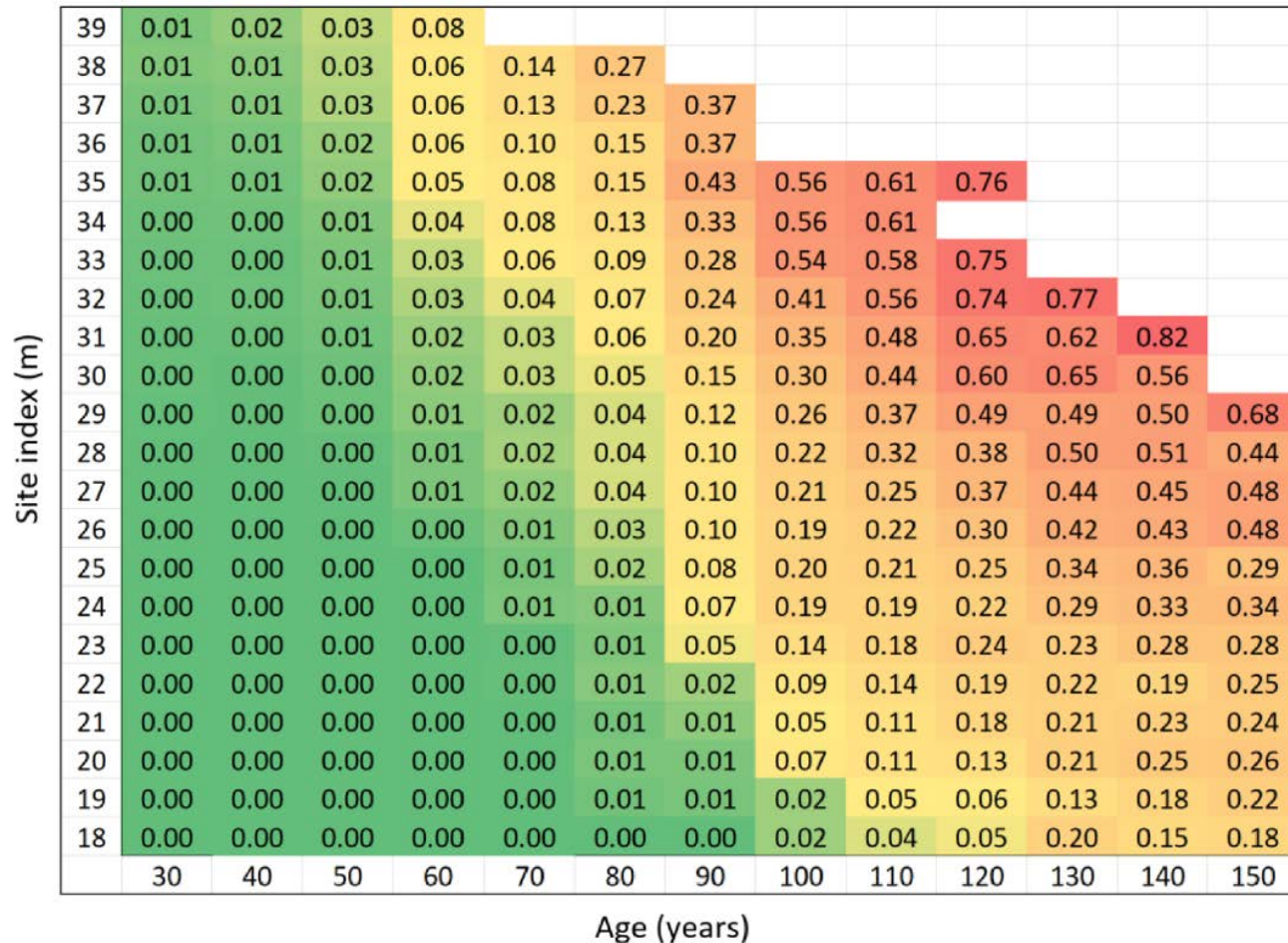
Management vs. climate effects in Bauges

Landscape scale

Beta diversity



Scots Pine drought mortality in southern Poland



- ~750,000 ha of forests in southern Poland
- Sanitation felling data, climatic water balance
- Airborne laser scanning data at 20*20m resolution

I-Maestro: Projecting the future of our forests



PROJECTING THE FUTURE OF OUR FORESTS

<https://www.youtube.com/watch?v=5Ux6zB24CtM>

▶ ▶| 🔊 0:02 / 13:06 • Introduction >

