



Smart decisions for sustainable forest management

OPTimising FORest management decisions for a low-carbon, climate resilient future in Europe

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- ❑ Call: Enhancing science-based knowledge on EU forests', including old-growth forests, capacities to mitigate climate change
- ❑ TOPIC ID / Type of action: HORIZON-CL6-2021-CLIMATE-01-09 / HORIZON-RIA Research and Innovation Actions
- ❑ Duration: 48 months (01/01/2023 – 31/12/2026)
- ❑ Budget: approx. 5M Euro (EC 4,289,077.50 + UKRI)
- ❑ Coordinator: National Meteorological Administration, Romania
- ❑ 16 partners from 9 countries



Primary objective and ambition

- Co-develop a Decision Support System to provide adaptation and mitigation options.
- Support the science-based optimization of Forest Ecosystem Services (incl. decarbonisation).
- Enhance forest resilience across Europe.

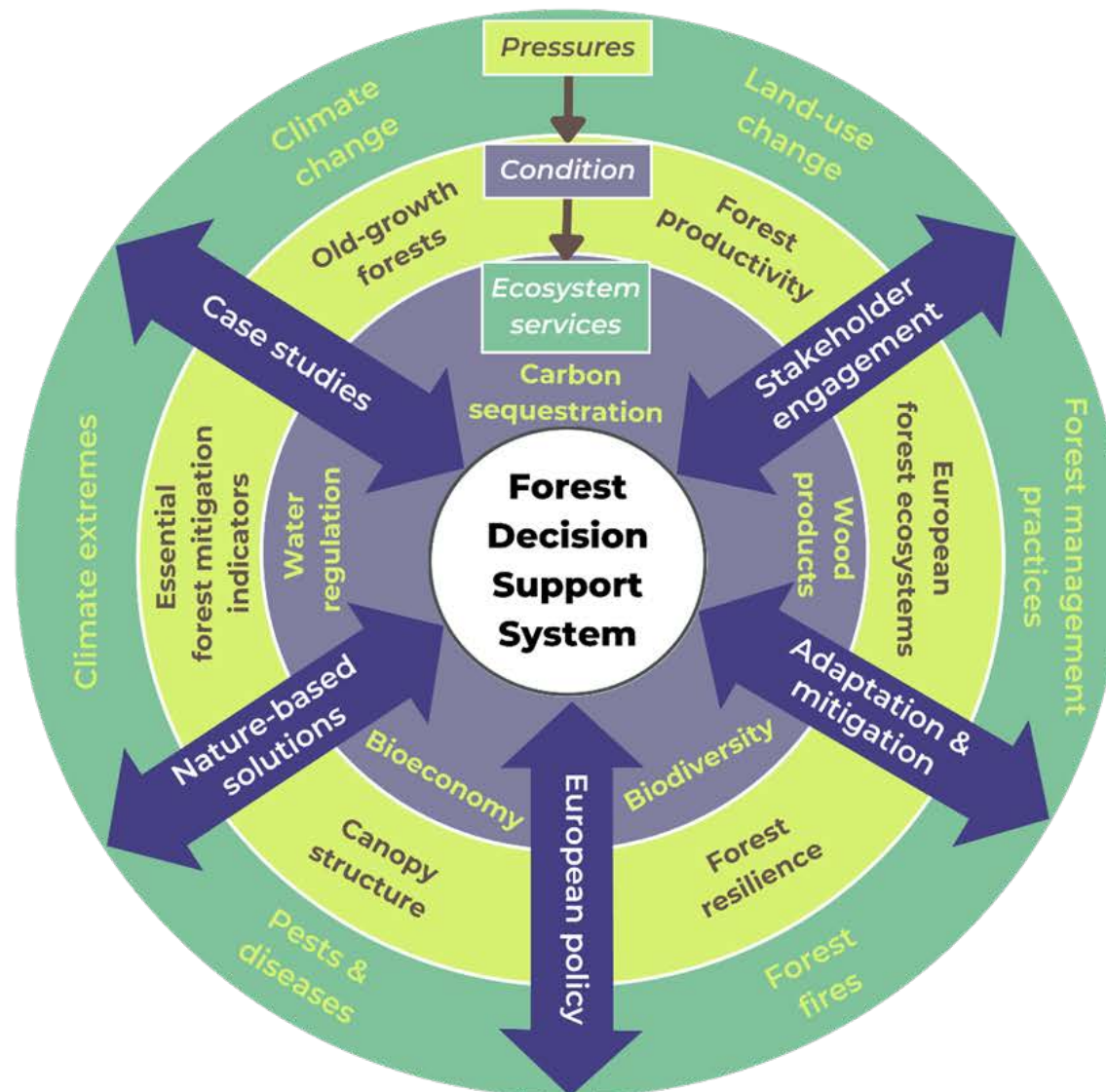




The DSS is the central focus.

The OptFor-EU DSS
incorporates data about
External Pressures, Forest
conditions, and Forest
Ecosystem Services.

OptFor-EU concept diagram





Specific Objective 1

Improve the
characterization of EU FES

Specific Objectives

- Improves **the science-based characterisation of FES** (e.g. carbon stocks and sinks) for EU forests, with a major focus on old-growth forests, supported by **co-development** with forest end users
- The **current state of FES and future projections (i.e., 2050) are quantified** using (i) available datasets (e.g., in situ observations, reanalysis, and satellite remote sensing products; models and scenarios) and (ii) data collected within Case Study Areas (CSAs)

FES: Forest Ecosystem Services



Specific Objective 2

Provide a focused FES modelling framework

Specific Objectives

- **Model simulations tackle the integration of European forests, including FMP***, in a scalable modelling framework that extends from CSA** to the European domain.
- Models are enhanced **to improve the representation of forest land cover and FMP across Europe**; model simulations address the impacts of FMP, socio-economic and climate change scenarios on forest processes and FES***.

*FMP: Forest Management Practices

**CSA: Case Study Areas

***FES: Forest Ecosystem Services



Specific Objectives

- Based on scientifically-informed decisions that enhance FES (including decarbonisation) and forest resilience.
- Deliver a ready-to-use solution for supporting current and future forest managers and other forest stakeholders **to better understand the differences and benefits between managed and unmanaged forests in terms of carbon sequestration.**

*FES: Forest Ecosystem Services
FMP: Forest Management
Practices*

Specific Objective 3

**Empower forest managers
and other stakeholders to
implement sustainable
FMP**



Specific Objective 4

Develop a novel DSS to
optimize FMP

Specific Objectives

- Co-Develop **toolboxes** to ensure the stakeholder's requirements are addressed and the science-based solution provided by the DSS is **adopted into good practices**.
- Support forest managers to **identify optimal FMP* and NBS** for the provision of sustainable FES*** and resilient forest** ecosystems across Europe.

FMP: Forest Management Practices*

*NBS**: Nature Based Solutions*

*FES***: Forest Ecosystem Services*



Specific Objectives

Specific Objective 5

Bridging (i) EU strategic priorities, (ii) robust science, and (iii) stakeholders' needs in the forest and forest-based sectors

- **Reduction in net emissions** of GHG related to FES*
- **Boost sustainable use of forest resources** (including the long-lived wood products), and
- Smooth **integration** of different economies and societal values at European scale

*FES: Forest Ecosystem Services



8 Case Studies across Europe to support the upscale of the results

Case Study Areas

NO: CC impact on the decarbonisation and FES supply potential of forests in Vestfold and Telemark County

LT: CC impact on the decarbonisation and FES supply potential of forests within the Čepkeliai - Dzūkija National Park

UK: CC impact on UK forest decarbonisation and FES supply potential using Wytham Woods as a case study

DE: Devising rules for budgeting carbon and timber earnings under consideration of other forest ecosystem services and CC

AT: Identifying the maximum decarbonisation potential of the Biosphere Reserve Vienna Woods without jeopardizing other demanded ecosystem services

RO: An altitudinal assessment of CC impact on Romanian forests decarbonisation and FES supply potential

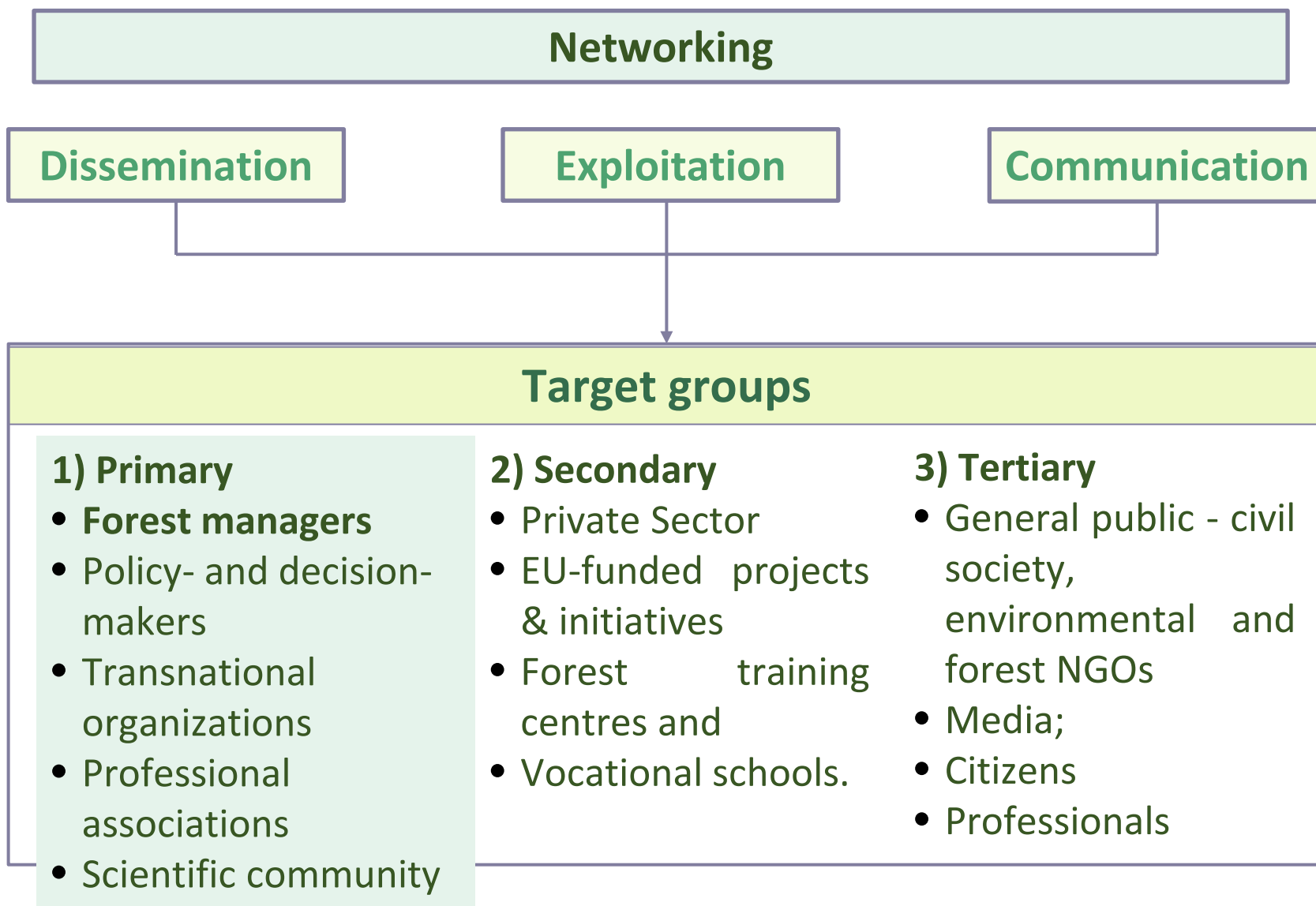
ES: CC impact assessment on Extremadura pine forests decarbonisation potential. Specific Challenge addressed: wildfires, drought, erosion, rural depopulation

IT: Sustainability of FES provided by the Model Forest of Florentine Mountains (*Foresta Modello Montagna Fiorentina*) under the CC perspective and “climate neutrality” demands



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Measures to maximise the impact



OptFor-EU Decision Support System– specific objectives



- ✓ An interactive DSS to support forest managers in adapting to and mitigating climate and socio-economic impacts by simulating the effects of various management strategies.
- ✓ Essential Forest Mitigation Indicators (EFMI) enable the quantification of decarbonisation potential and the evaluation of management scenario sustainability.
- ✓ The co-developed DSS guides the selection of optimized forest practices based on carbon storage and sustainable wood harvesting goals.



OptFor-EU Forest DSS



OptForEU, One product **Many solutions**
Decision support system for forest management



Evaluator



Explorer



Toolbox



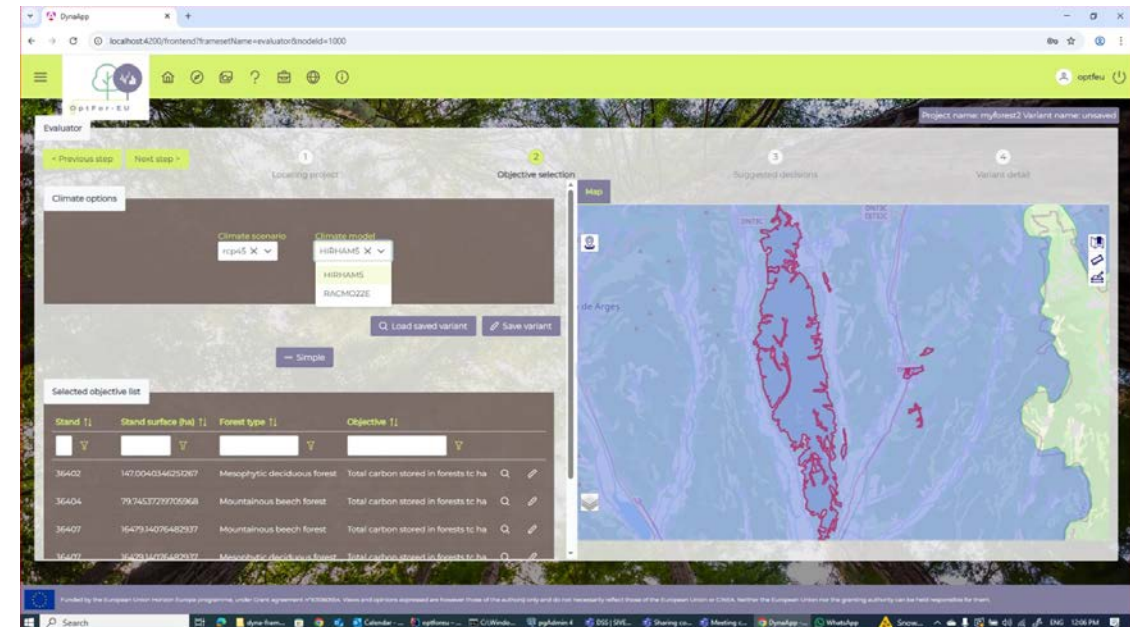
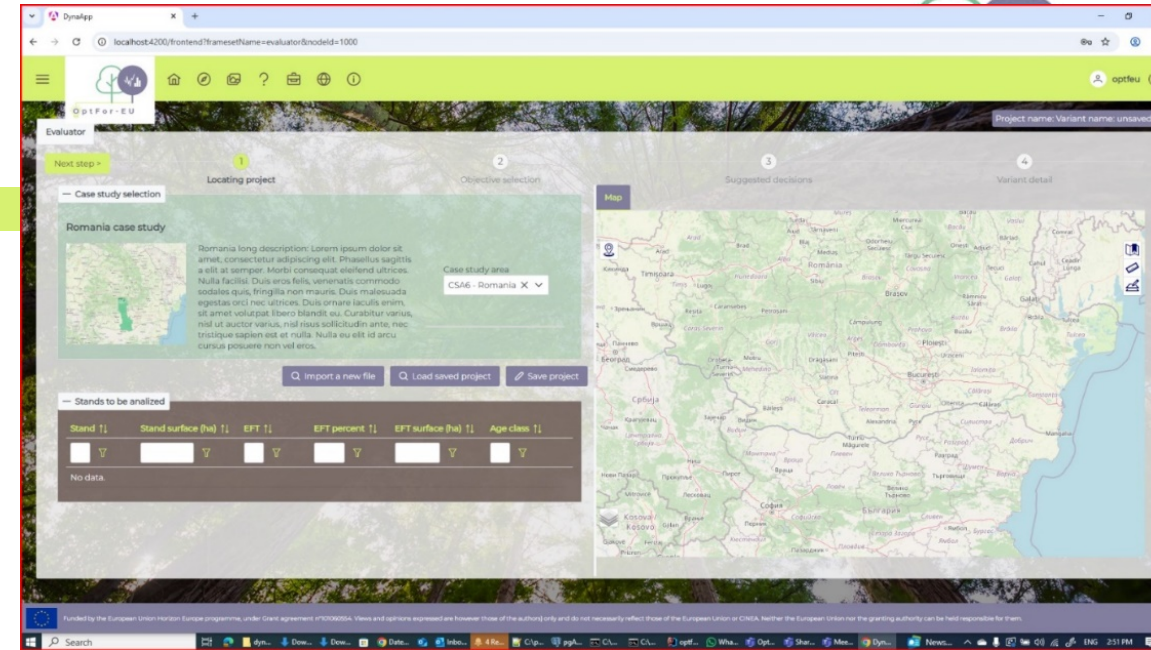
Forest Wiki



Suggestions

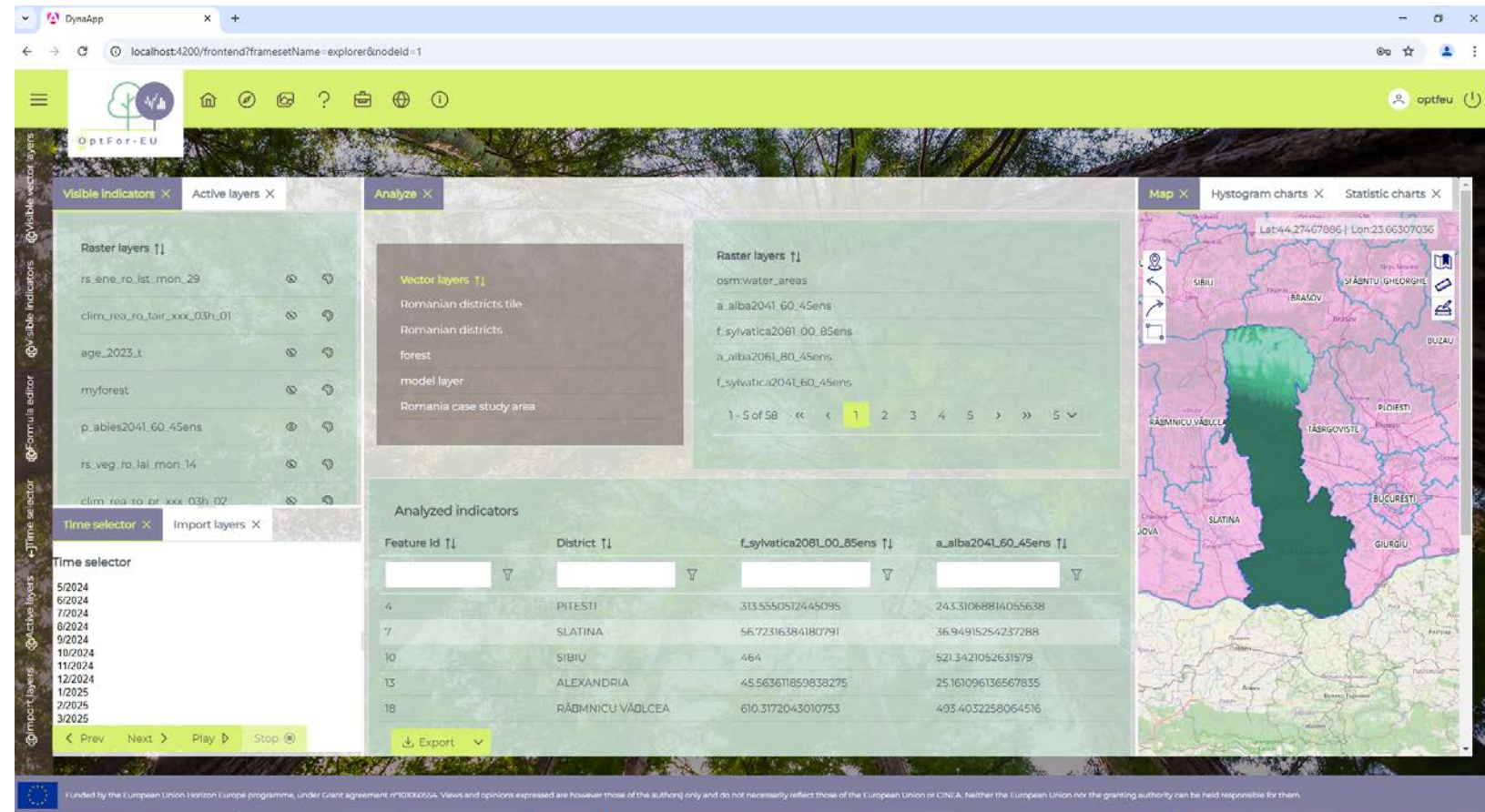
DSS Modules - Evaluator

- ❑ The **Evaluator module** uses the simulation output at stand, company or national –level, depending on the user profile (**policymaker, forest owner, forest manager**) as stored in the OptFor-EU Database.
- ❑ The OptFor-EU DSS integrates with user-specific preference information on selected ecosystem services to **evaluate the performance of different mitigation measures**.



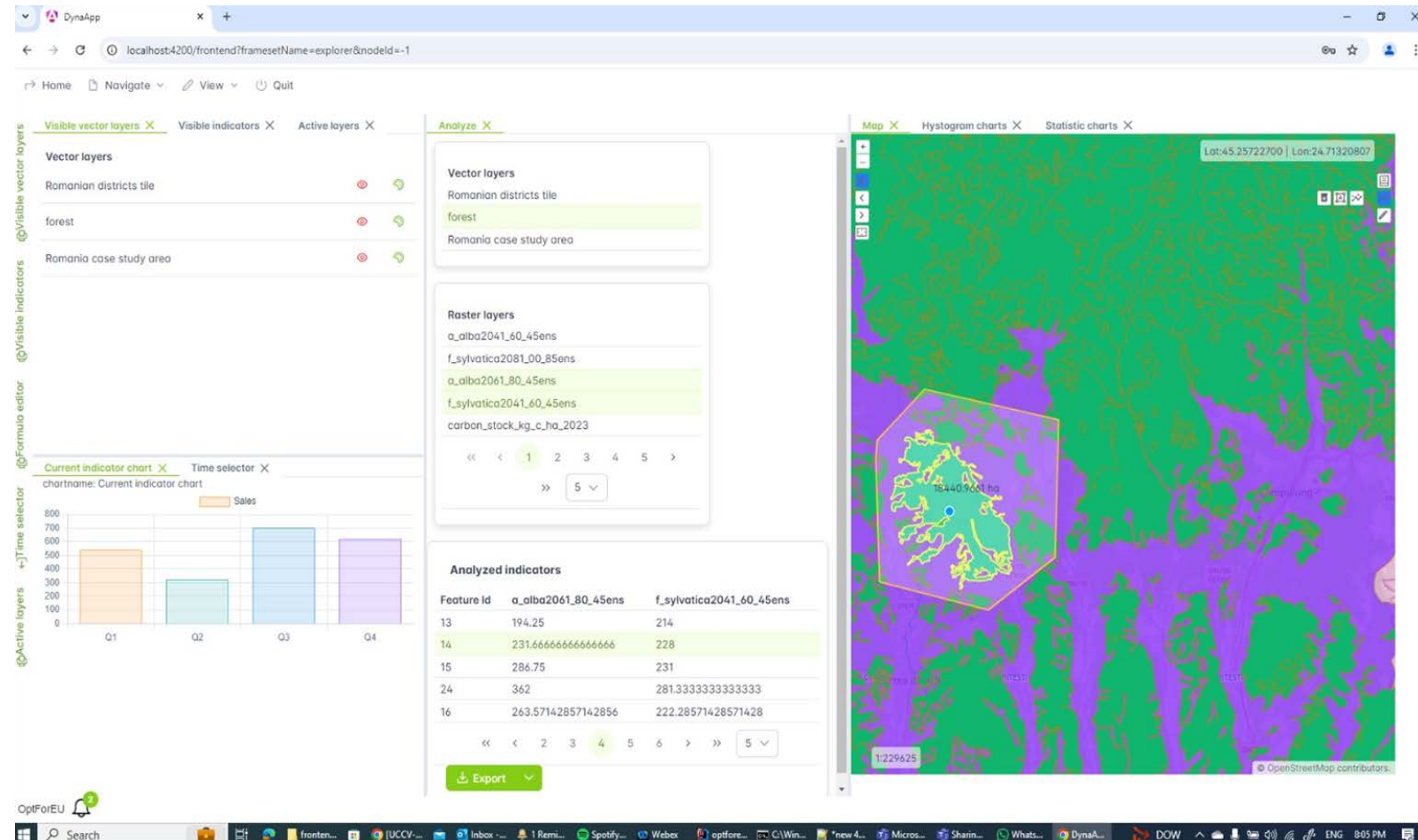
DSS Explorer - analyse

- The Explorer module provides unrestricted access to the DSS available data / metadata in the OptFor-EU Database to support the end-user in the selection of appropriate FMPs or scenarios for a given context.



Development of a Dashboard Visual Interface for the forest managers - DSS – Explorer

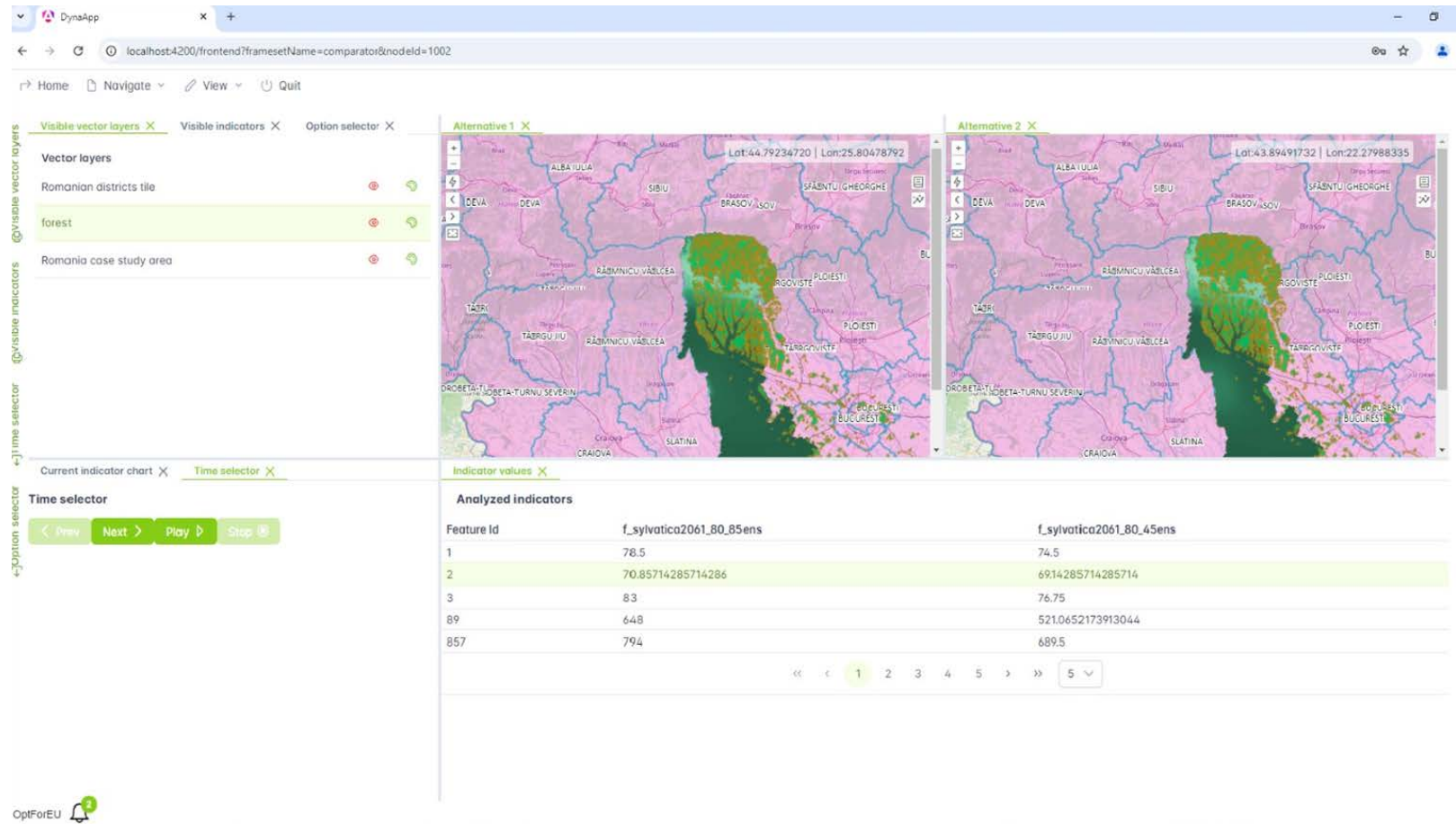
- ❑ The Explorer module provides unrestricted access to the DSS available data / metadata in the OptFor-EU Database to support the end-user in the selection of appropriate FMPs or scenarios for a given context.



DSS Evaluator - comparison functionality



- ❑ The comparison functionality makes it possible to show the values for each alternative side by side on the same screen



OptFor-EU Forest DSS – Research / Management Questions



1. How do mitigation and no measures climate scenarios (i.e. RCP 4.5 and RCP 8.5) affect the dynamics of growing stock in relation to forest type and management regime?
2. What is the impact of intensive vs. conservative harvesting strategies on wood removal under future climate conditions?
3. How can a management practice be selected to achieve specific EFMI-based objectives?
4. How should management practices be chosen to optimize both tree species diversity and soil carbon storage?



Select area of interest and its different characteristics



OptFor-EU

Project name: Demo

Variant name: unsaved

1

Locating project

2

Suggested decisions

Case study selection

Romania case study

Romania long description: Lorem ipsum dolor sit amet, consectetur adipiscing elit. Phasellus sagittis a elit at semper. Morbi consequat eleifend ultrices. Nulla facilisi. Duis eros felis, venenatis commodo sodales quis, fringilla non mauris. Duis malesuada egestas orci nec ultrices. Duis ornare iaculis enim, sit amet volutpat libero blandit eu. Curabitur varius, nisl ut auctor varius, nisl risus sollicitudin ante, nec tristique sapien est et nulla. Nulla eu elit id arcu cursus posuere non vel eros.

Case study area

CSA6 - Romania X

create a new project

Import a new file

Load saved project

Delete project

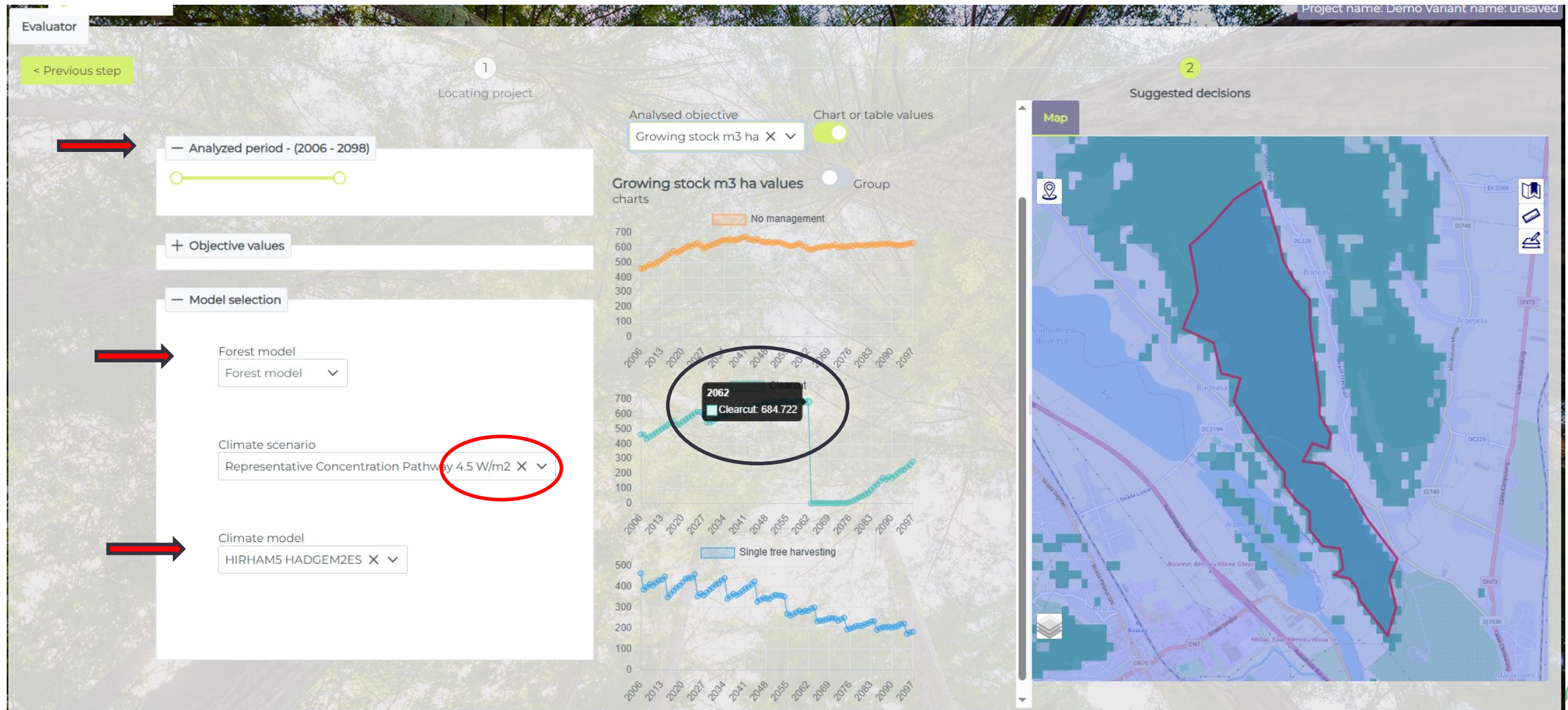
Stands to be analyzed

Stand	Stand surface (ha)	EFT	EFT percent	EFT surface (ha)	Age class
383	852.66	5	100	852.66	41-60

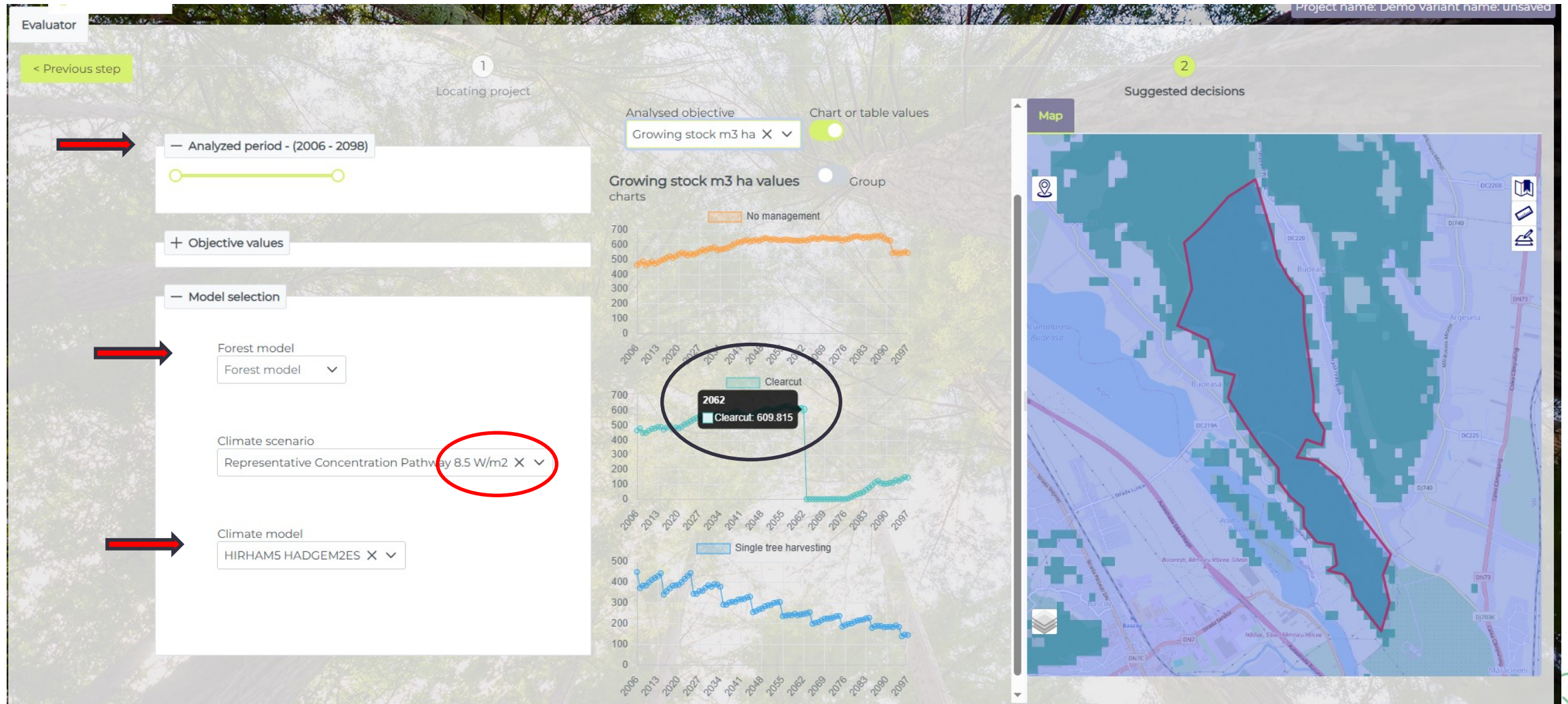
Map

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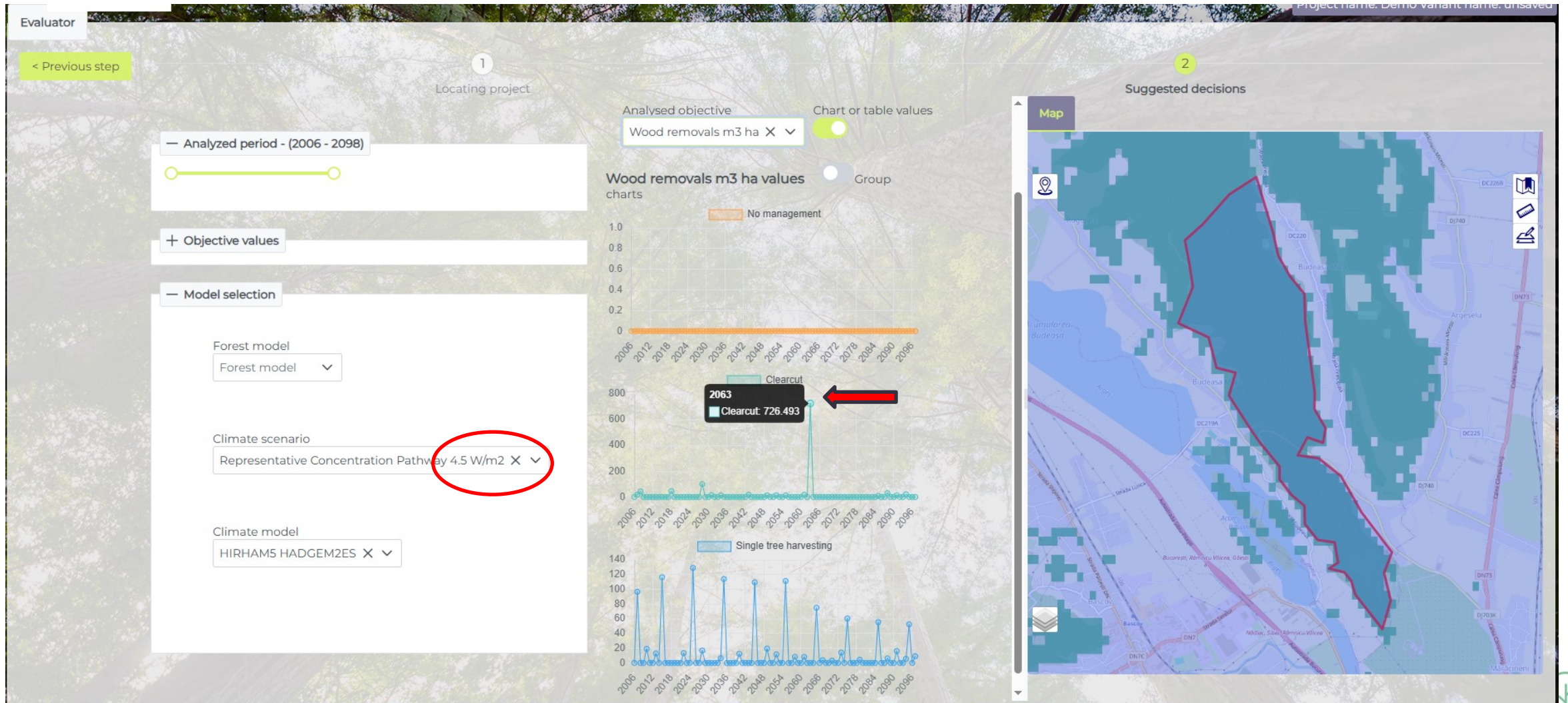
How do RCP 4.5 and RCP 8.5 climate scenarios affect the dynamics of growing stock in relation to forest type and management regime?



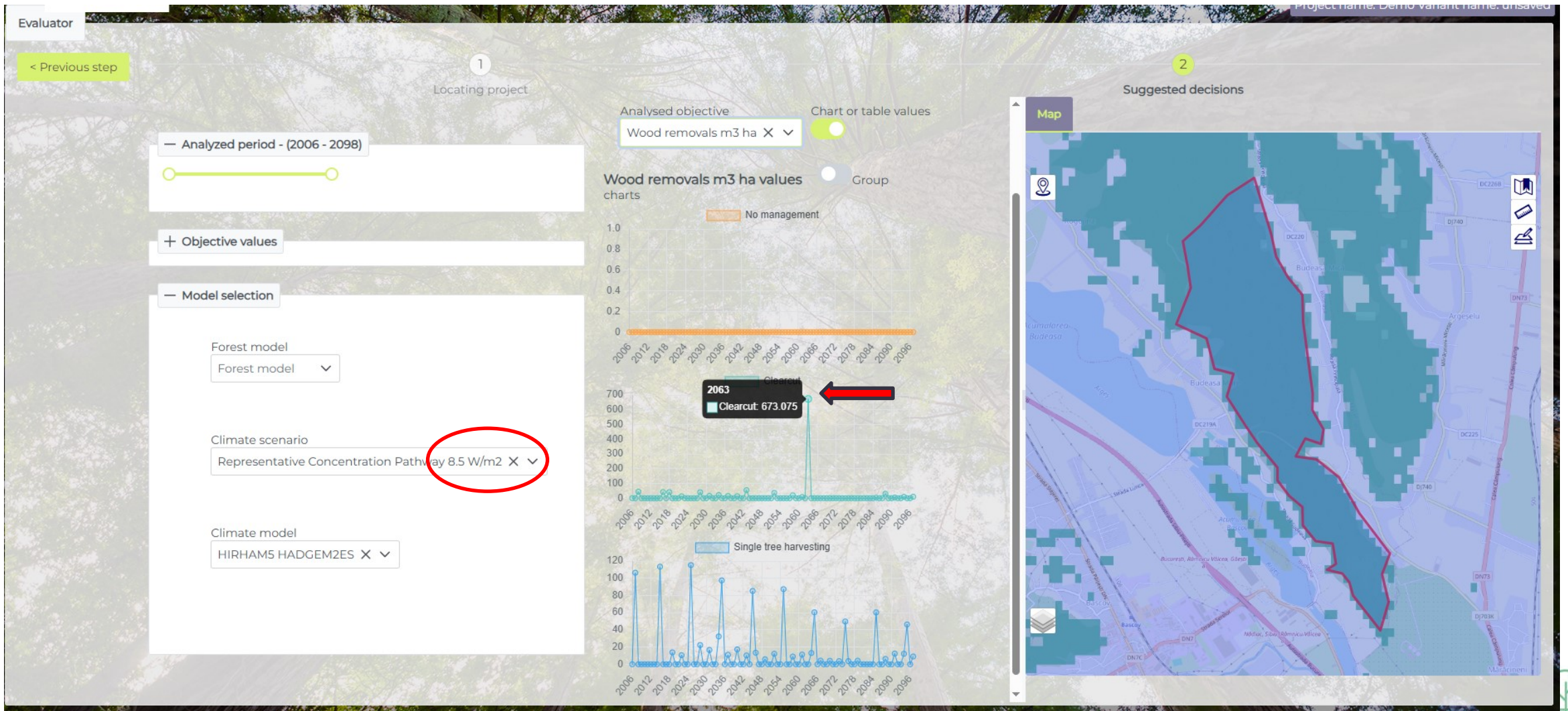
How do RCP 4.5 and RCP 8.5 climate scenarios affect the dynamics of growing stock in relation to forest type and management regime?



What is the impact of intensive vs. conservative harvesting strategies on wood removal under future climate conditions?



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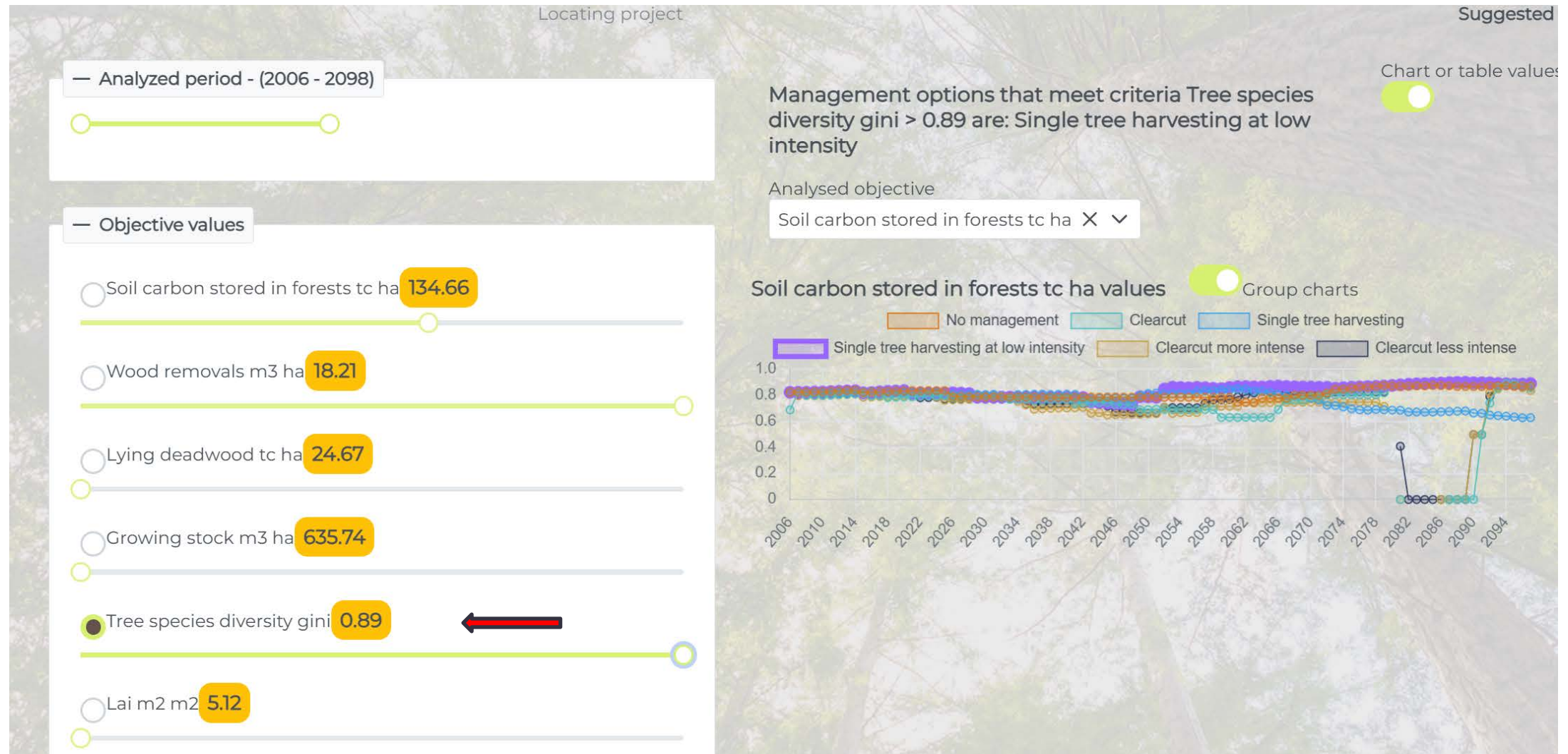
How can a management practice be selected to achieve specific EFMI-based objectives?



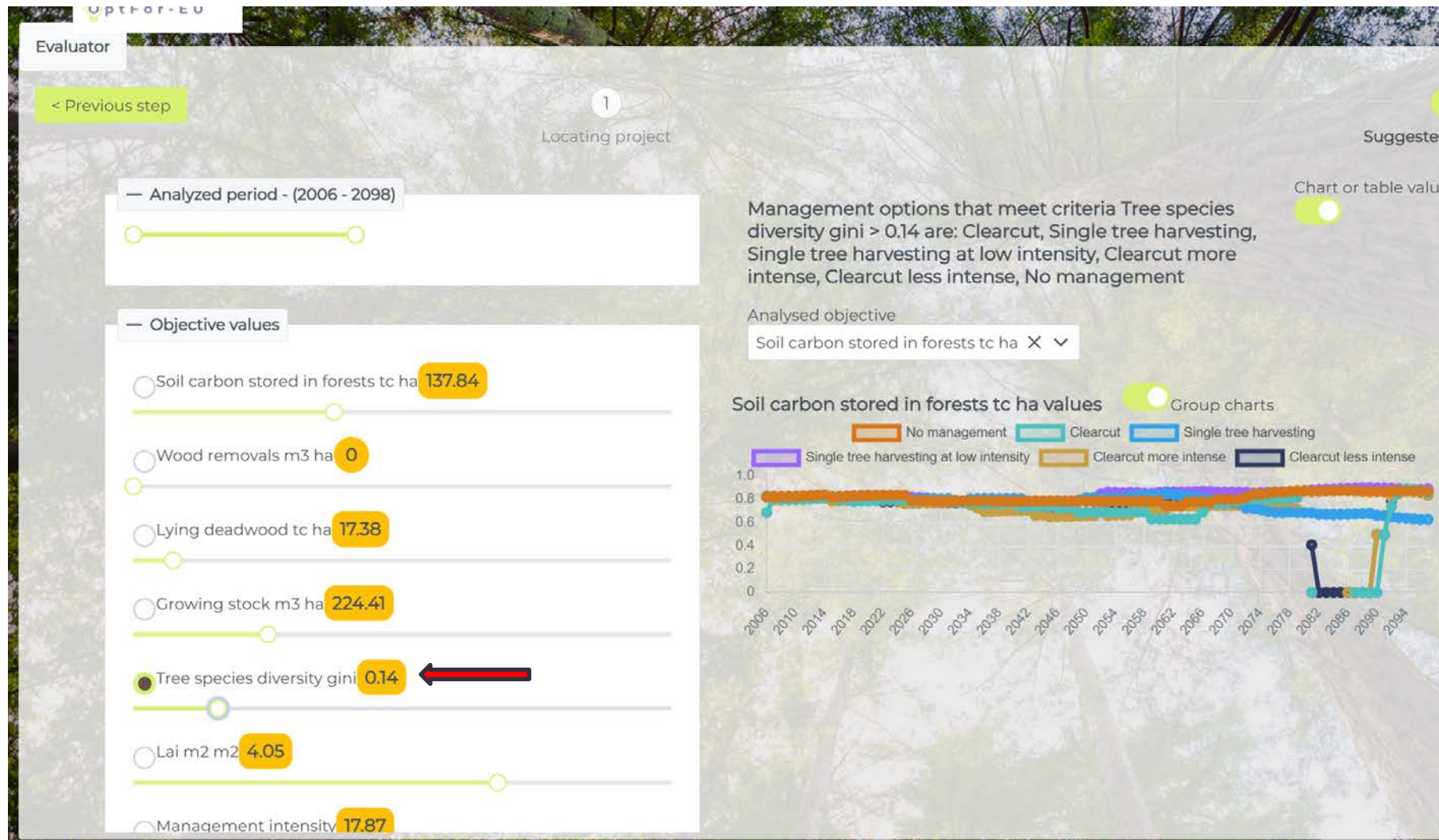
How can a management practice be selected to achieve specific EFMI-based objectives?



How should management practices be chosen to optimize both tree species diversity and soil carbon storage?



How should management practices be chosen to optimize both tree species diversity and soil carbon storage?



Current Status of the DSS Prototype

DSS Component	Active Functionality	Development Status
Study area selection	Active	Implemented
Forest type selection	Active	Implemented
Climate scenarios (RCP)	RCP 4.5 and RCP 8.5	Implemented
Forest management scenarios	3 comparable models	Under testing
Active EFMI indicators	<i>Carbon stock, growing stock, wood removal and others</i>	Active
Visual output of indicator trends	Interactive	Beta version
Identification of optimal FM	Not yet available	Planned for the next period

<https://optforeu.simavi.ro/dyna/static/en/frontend>

Future Directions in OptFor-EU DSS Development



- ✓ Integration of European Forest Management Indicators for all European Forest Types (EFTs) across all Case Study Areas (CSAs), and ultimately at the European scale
- ✓ Tailored recommendations for optimal forest management practices specific to each EFT
- ✓ Functional expansion to enable multi-purpose assessment, including nature-based solutions (NBS), climate resilience, and biodiversity conservation
- ✓ A web-based user interface co-developed with stakeholders, aiming for Technology Readiness Level 7 (TRL7).



Takeaway message

The OptFor-EU DSS is a dynamic and evolving platform designed to:

- ❖ Facilitate evidence-based decision-making by integrating climate projections and advanced forest modelling
- ❖ Simulate forest management scenarios under varying climate and socio-economic conditions
- ❖ Visualize the climate impacts on growing stock, wood removal, and a wide range of Forest Ecosystem Services (FES) — such as carbon sequestration, biodiversity, and regulatory functions — assessed through Essential Forest Mitigation Indicators (EFMI)
- ❖ Provide guidance for transitioning to sustainable and climate-resilient forest management practices in line with decarbonisation objectives.



Thank you

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