I-MAESTRO

Patrick Vallet, Thomas Cordonnier & I-Maestro team*

ForestValue mid-term meeting

17-18 November 2020, videoconference

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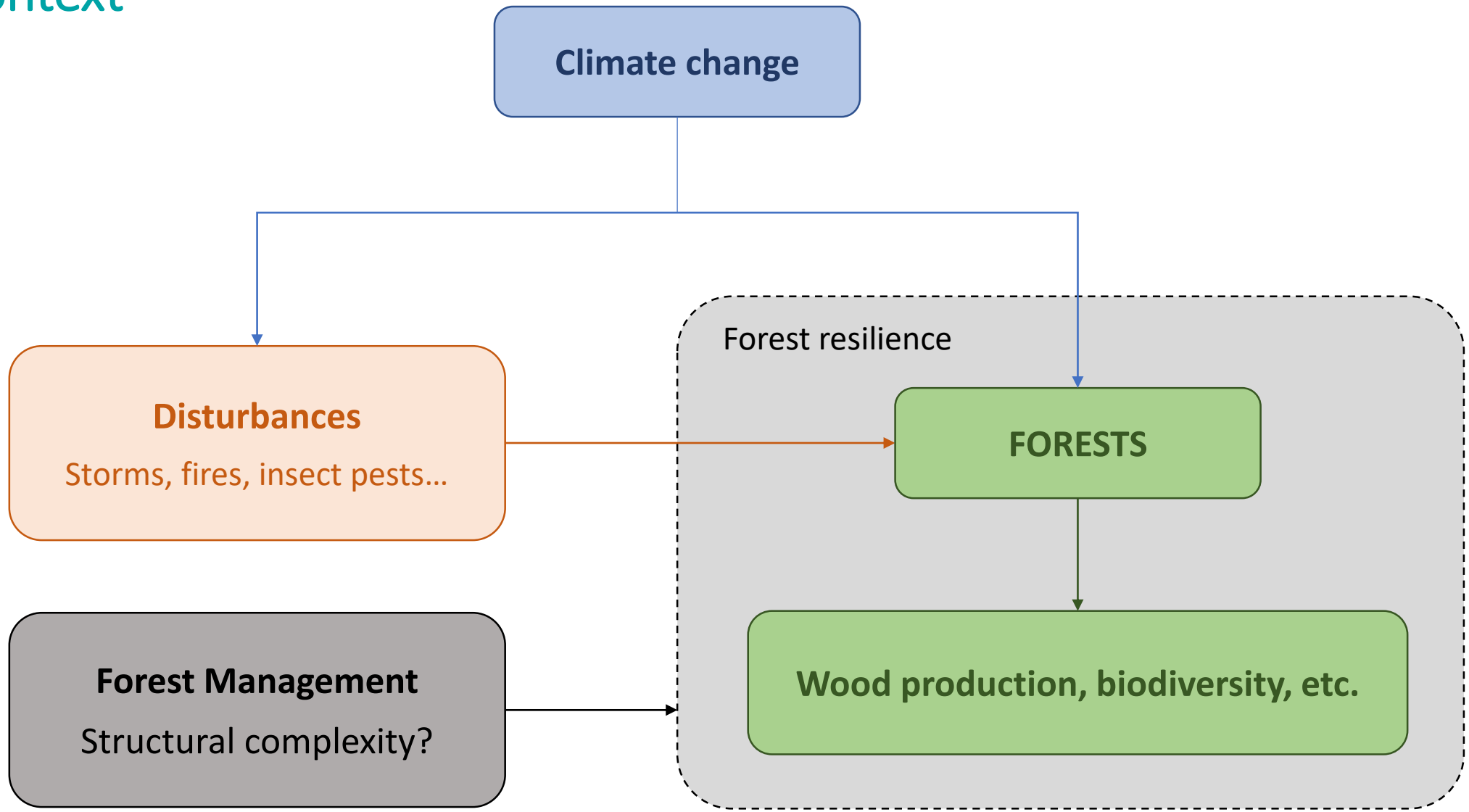
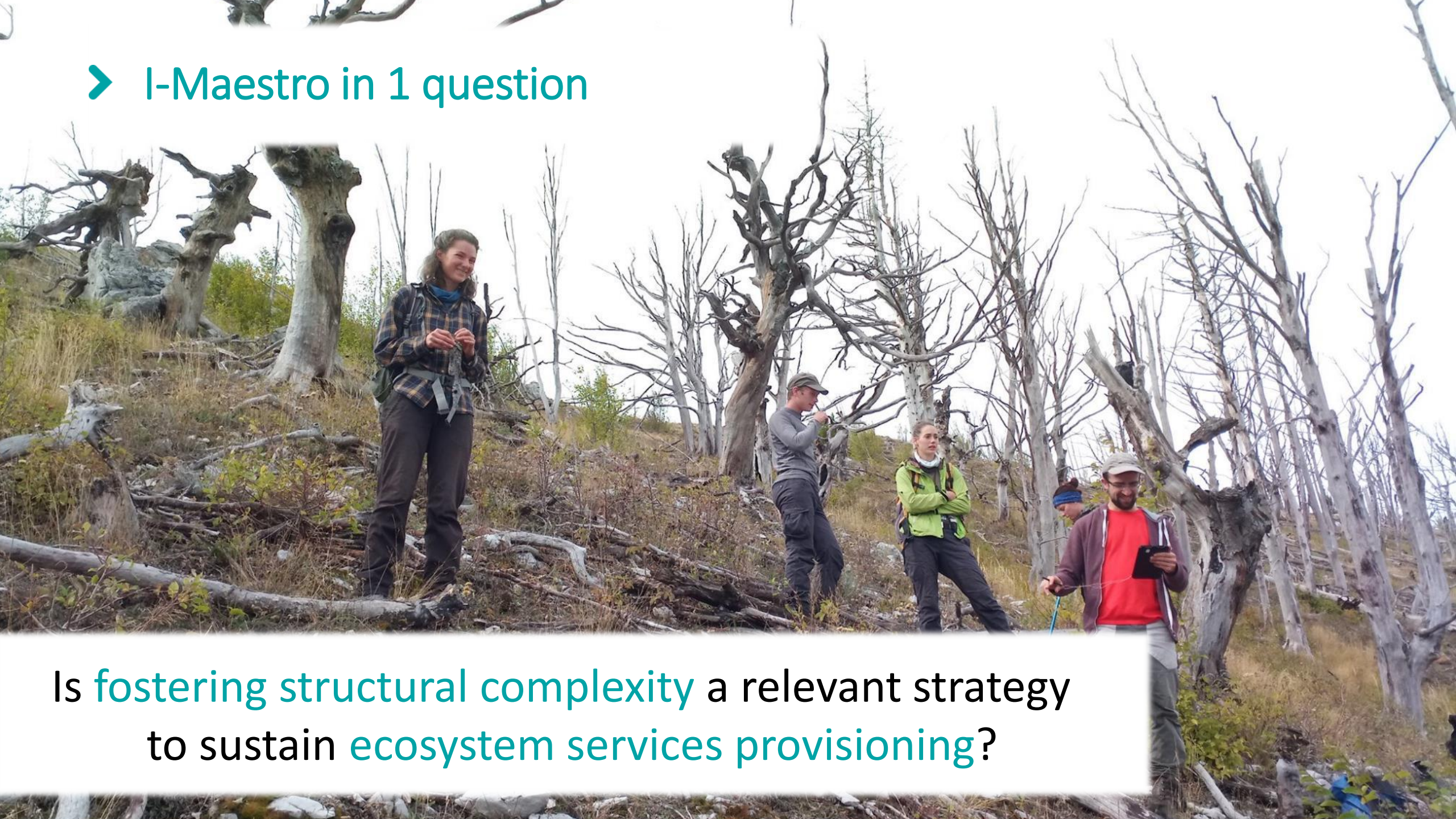
Context


Climate change
Disturbances
Storms, fires, insect pests…
Forest resilience
FORESTS
Wood production, biodiversity, etc.
Forest Management
Structural complexity?

I-Maestro in 1 question



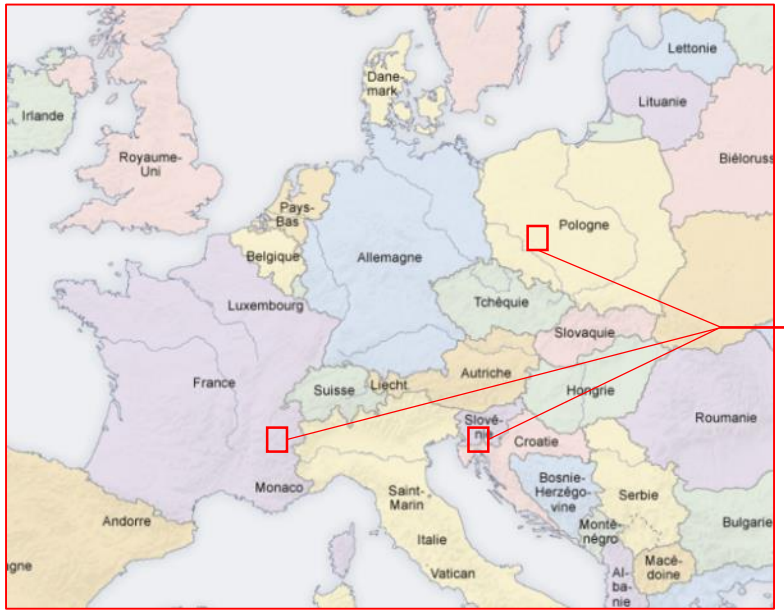
Is fostering structural complexity a relevant strategy to sustain ecosystem services provisioning?

Structural complexity: Country, landscape, and stand scales

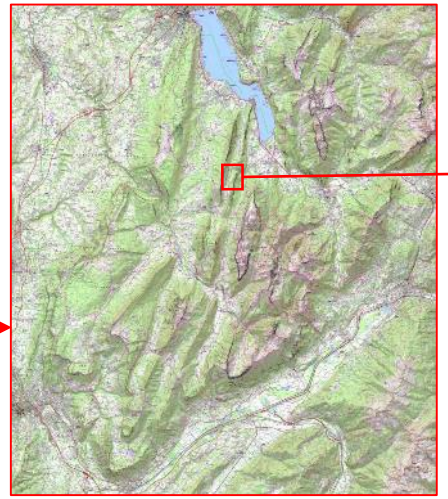
Are more complex forest structures more resilient to disturbances at different scales ?

Scales

Country



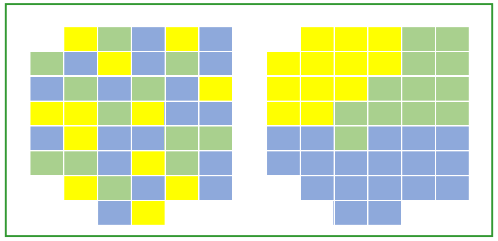
Landscape

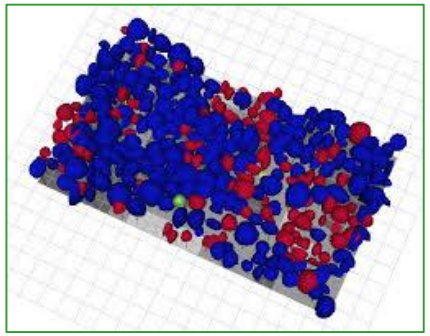


Stand

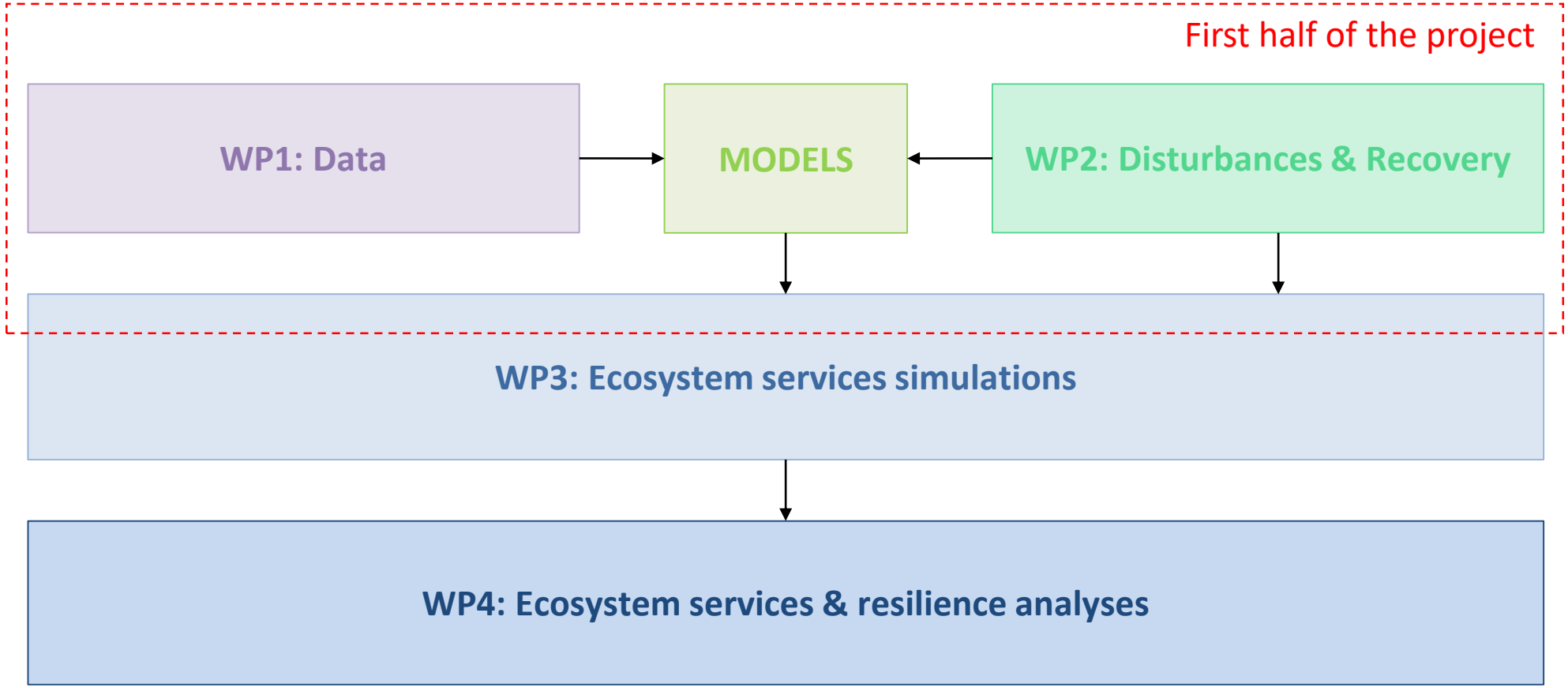
Complexity

Diversity of forest types





Project organization



Model evaluation

- **4 forest dynamics models:**

  Samsara2, 4C , LandClim, Salem

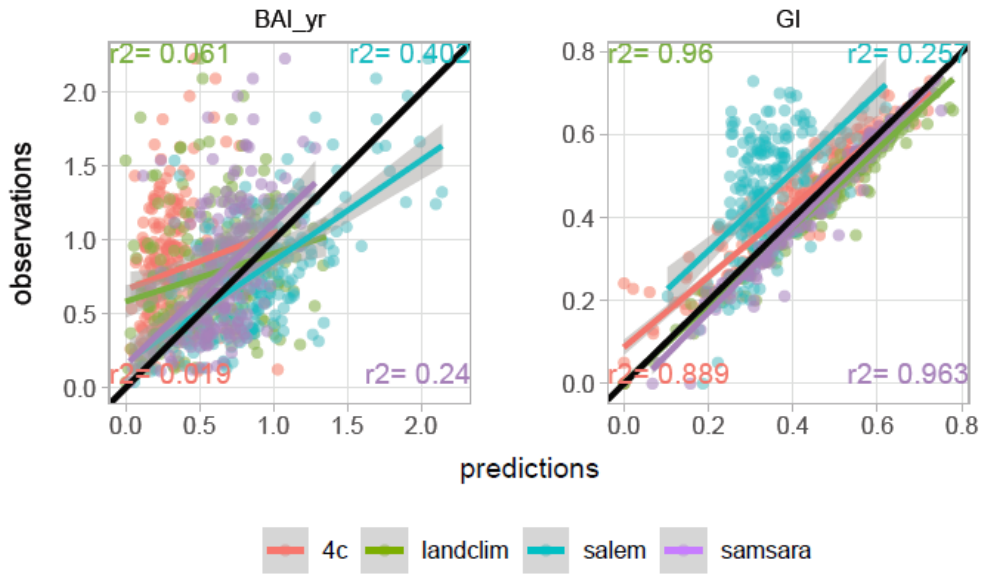
- **Evaluation of two components:**

  Evaluation of long term dynamics and management operation

  → 3 Forest sites from the PROFOUND database (up to 50 years)

  Evaluation of structural complexity (species diversity, diameter complexity, etc.)

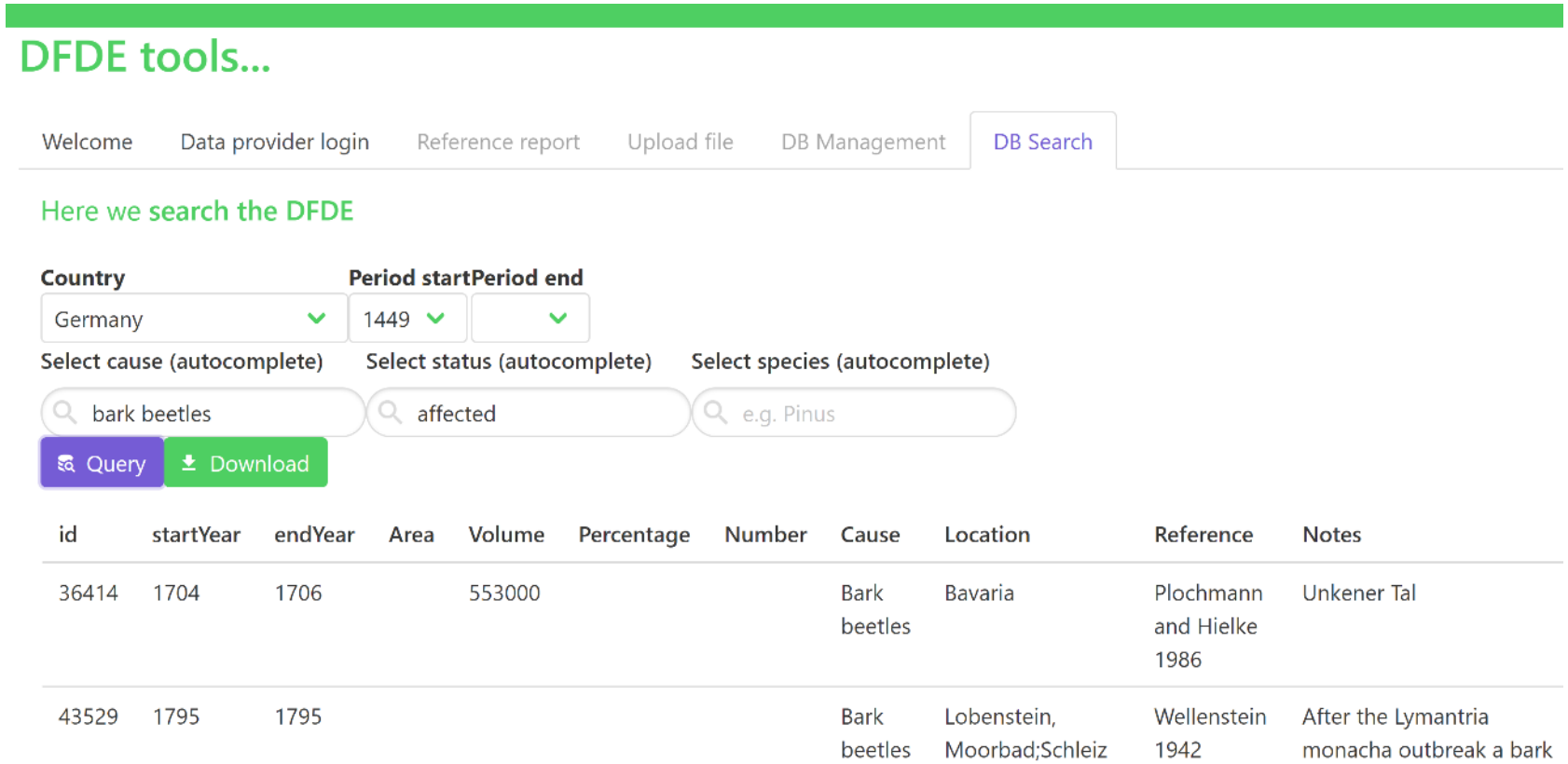
  → 234 NFI plots on the Bauges (France)



Development of a European Disturbance Database

https://dfde.efi.int/db/dfde_app.php

- **Objectives:**
  - ✓ Compiling the information about forest disturbances at the European level
  - ✓ Making this information accessible
  - ✓ Exploit the DB to build disturbance scenarios



id	startYear	endYear	Area	Volume	Percentage	Number	Cause	Location	Reference	Notes
36414	1704	1706		553000			Bark beetles	Bavaria	Plochmann and Hielke 1986	Unkener Tal
43529	1795	1795					Bark beetles	Lobenstein, Moorbad;Schleiz	Wellenstein 1942	After the Lymantria monacha outbreak a bark

Development of a European Disturbance Database

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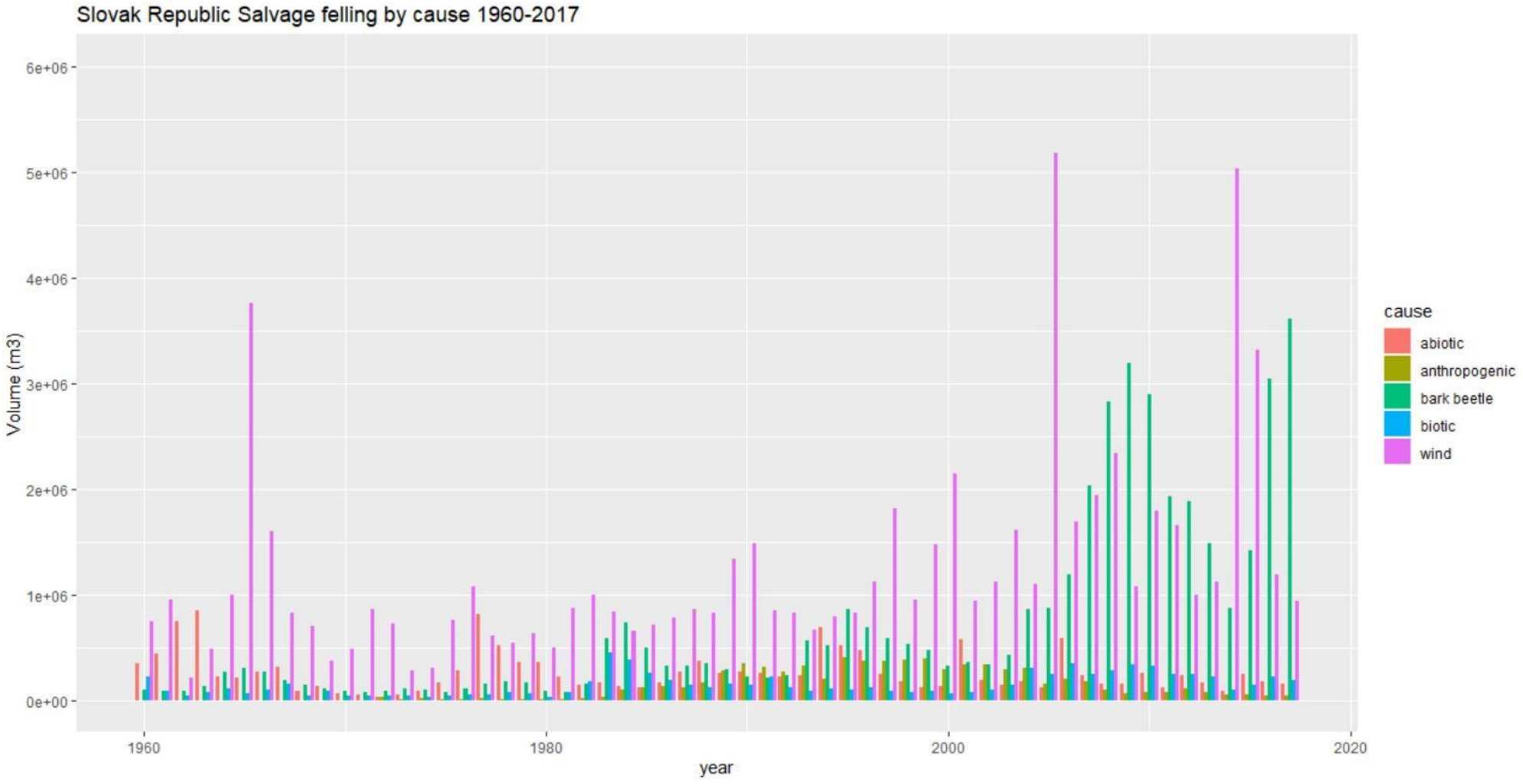
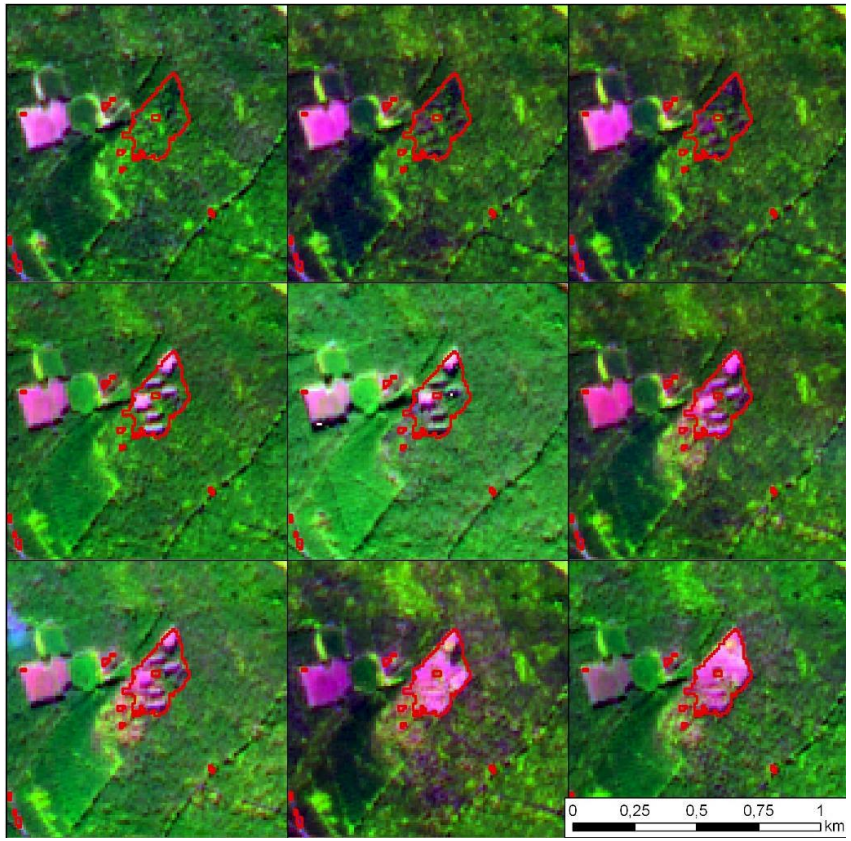
- **Example of a query**



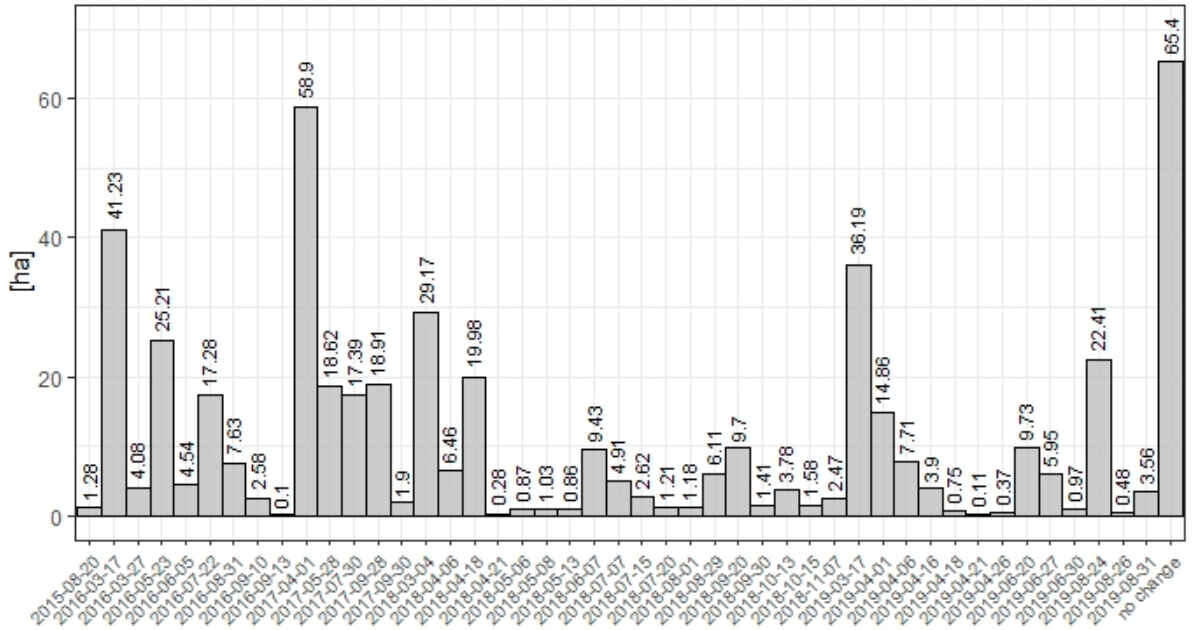
Automatic detection of disturbances using satellite data

- **Dense SENTINEL-2 time series**

  → Detection of structural changes in time series



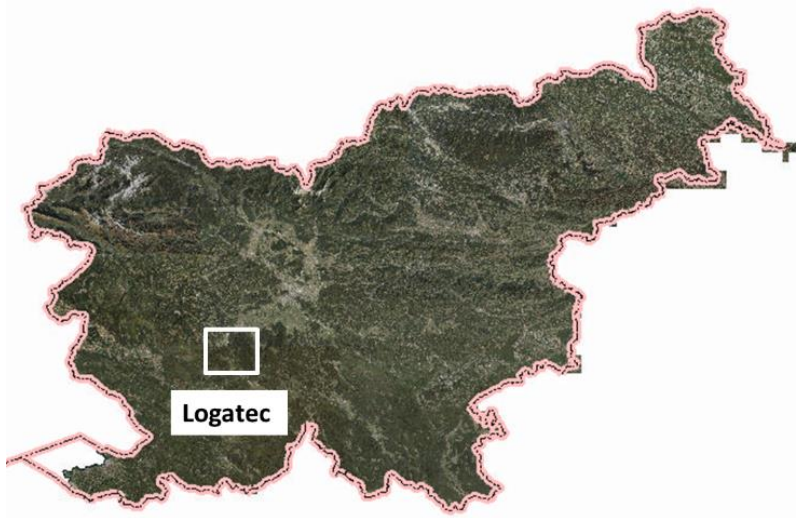
Changes detected in coniferous forests from 2015 to 2019 on the Milicz case study (Poland)



Empirical study: resilience after severe perturbation

- **Objective: provide better information of recovery processes**

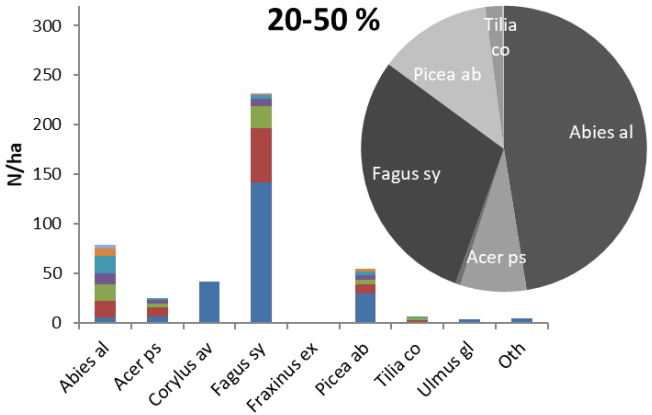
  Several case studies: **example from Slovenia**



Ice storm 2014

Bark beetle

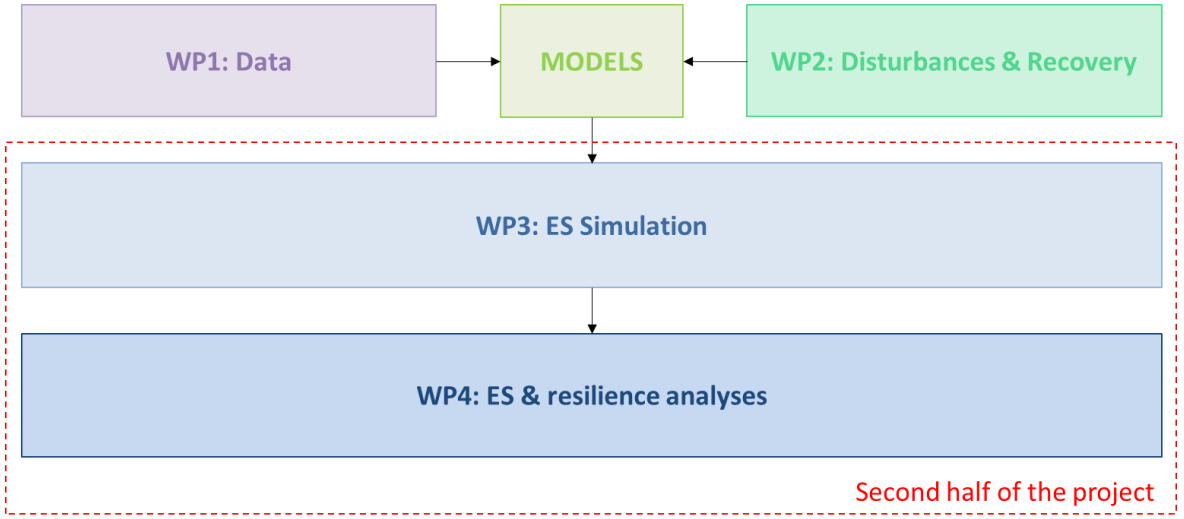
Salvage logging



Resilience after perturbation: European analysis

Compilation of existing data on recovery after perturbation at the European level

Second half of the project



1. **Focus on**
   - ✓ Disturbance scenarios for the future
   - ✓ Management scenarios

   → Performing simulations

2. **Analyze the results to**
   - ✓ Answer the main question:
     - ➔ Is fostering structural complexity a relevant strategy to sustain ecosystem services provisioning?
   - ✓ Transfer synthesis and recommendations to forest managers and stakeholders.

Thank you for your attention

Last I-Maestro plenary meeting, 28-30 October 2020

More information here: https://i-maestro.inrae.fr/