

# The European Commission's science and knowledge service

Joint Research Centre

## MAES Forest Pilot on ecosystem condition

**José I. Barredo**

European Commission – Joint Research Centre  
Bioeconomy Unit (D1)

*Civil Dialogue Group on Forestry and Cork*  
Brussels, 8<sup>th</sup> June 2017



# What is MAES?

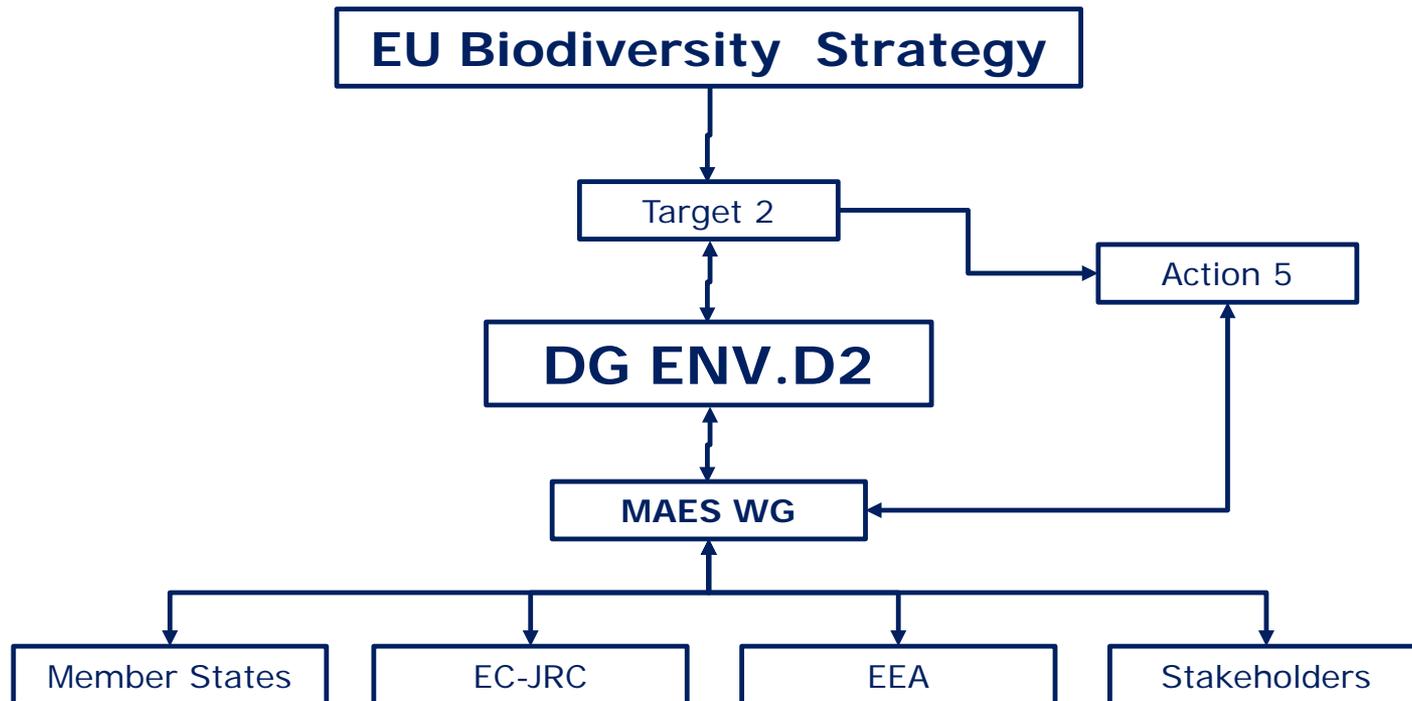
- Initiative supporting the implementation of the EU Biodiversity Strategy
- The Strategy outlines a number of targets and actions to stop biodiversity loss
- Mapping and assessment of the state of ecosystems and their services can help inform the policy decisions affecting the environment
- **MAES working group**
- Was set-up for providing support to MS in reaching Target 2 of the Biodiversity Strategy



# Target 2 of the Biodiversity Strategy

- **Target 2**: By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems
- **Action 5**: Improve knowledge of ecosystems and their services in the EU:
  - MS, with the assistance of the Commission, will map and assess the state of ecosystems and their services in their national territory by 2014, (...)
  - (...) assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by 2020

# MAES Working group



## MAES Pilots 2017



# Current activities of the MAES Pilots

- **Analytical framework** for mapping and assessment of ecosystem condition
- Describe the **link** between ecosystem condition and ecosystem services
- Appropriate **indicators** on condition
- List European **datasets** available to quantify the indicators
  
- Clear proposals for the Member States
- Validate and discuss with Member States (workshop)
  
- 5<sup>th</sup> MAES report by end of 2017

# MAES Forest Pilot on condition

## Participants:

DG-Environment (D1 and D2)

Joint Research Centre (D1)

European Environment Agency (EEA)

European Topic Centre on Biological Diversity (ETC-BD)

European Topic Centre on Urban, Land and Soil Ecosystems (ETC-ULS)

Member States and Stakeholders (workshop, 27-28 June 2017)

## Aim of the Pilot:

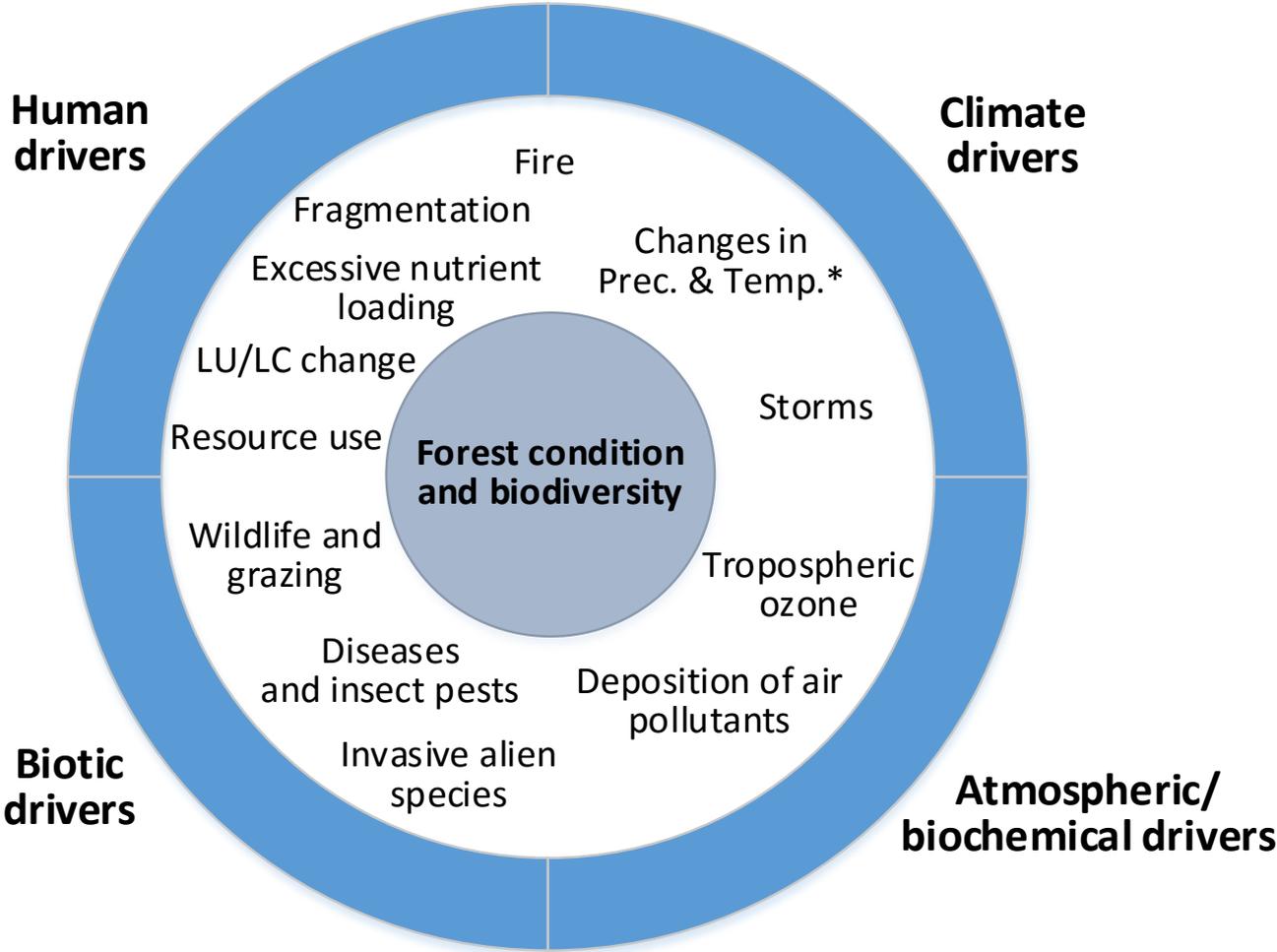
To elaborate an assessment framework (conceptual and analytical) on forest ecosystem condition in Europe.

The framework will contribute to the overarching goal of the Pilot, which is to identify an array of forest condition indicators and corresponding datasets.

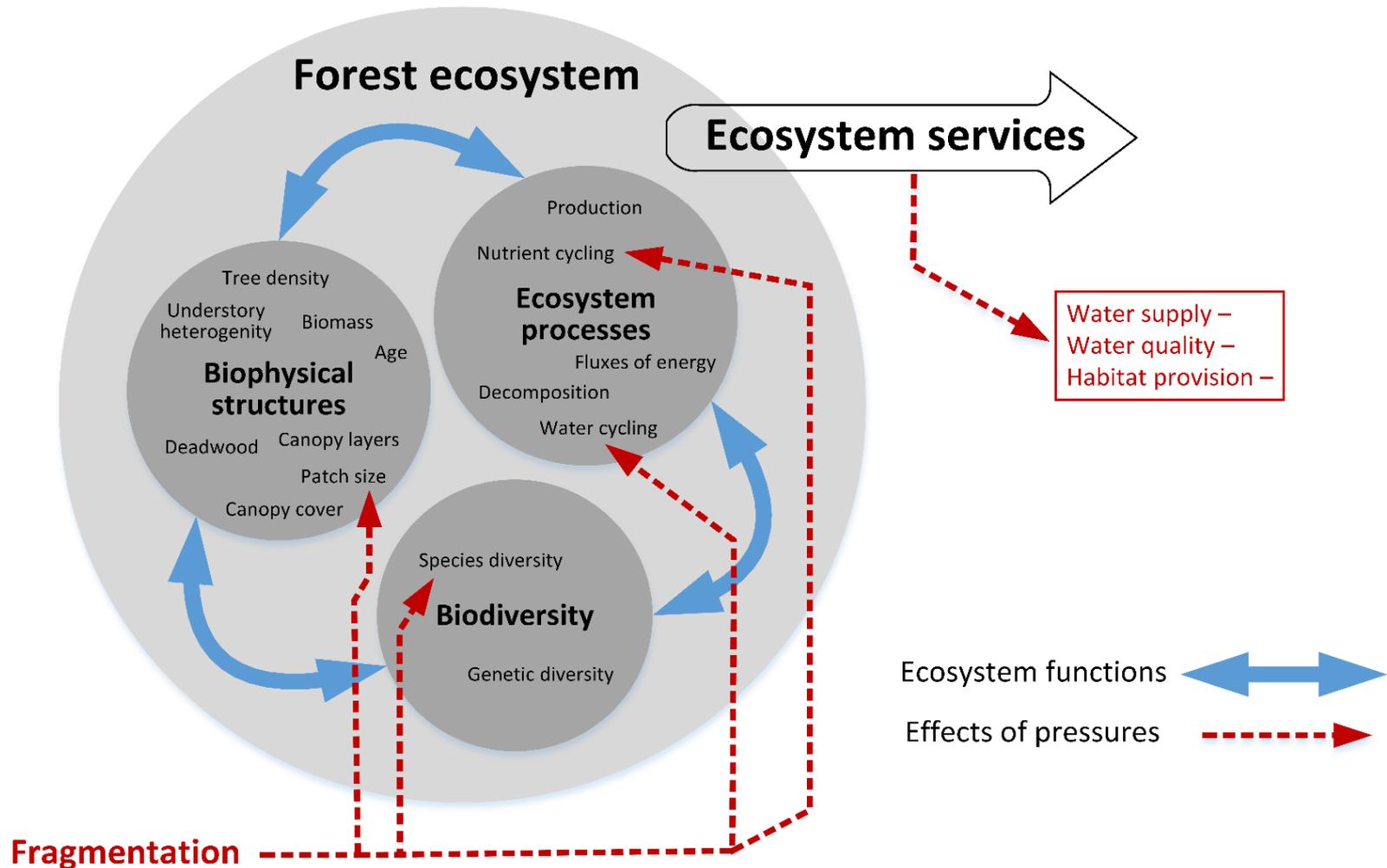
# Rationale

- Despite the amount of available information on forest ecosystems from ground surveys and remote sensing, assessing forest condition remains challenging
- Although indicators of forest condition are available, these are in some cases either limited in time, spatial scale or are relative to few dimensions of forest ecosystems
- In addition, there is lack of consensus regarding a definition of forest condition or health that can be operationalised with available indicators

# Drivers and pressures of forest ecosystems (draft)



# Effects of pressures on ecosystem services



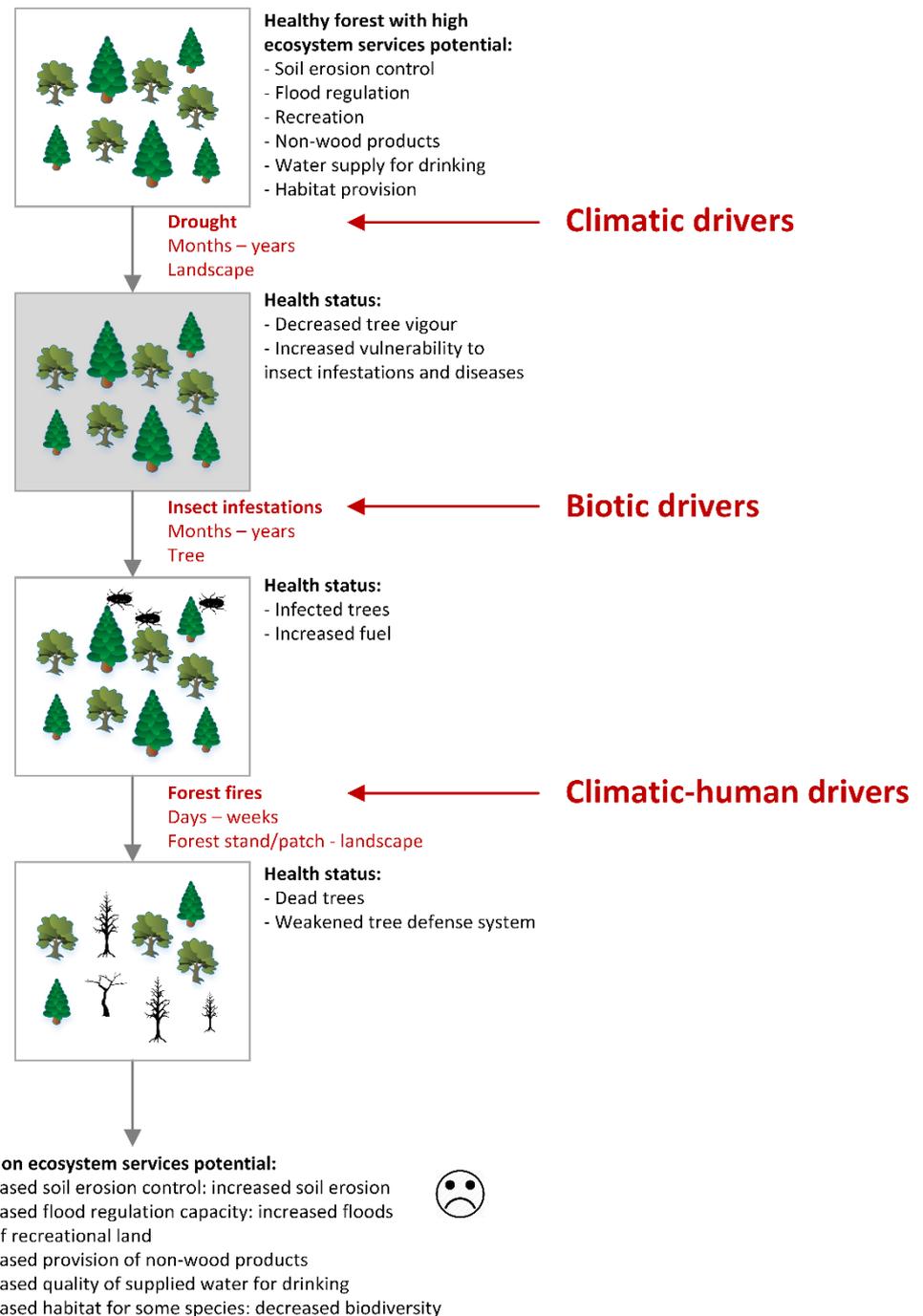
Ecosystem functions are the myriad of subsets of interactions between biophysical structures, biodiversity and ecosystem processes that underpin the capacity of an ecosystem to provide ecosystem services (MAES, 2013)

# Example representation of pressures affecting the potential of forest ecosystem services

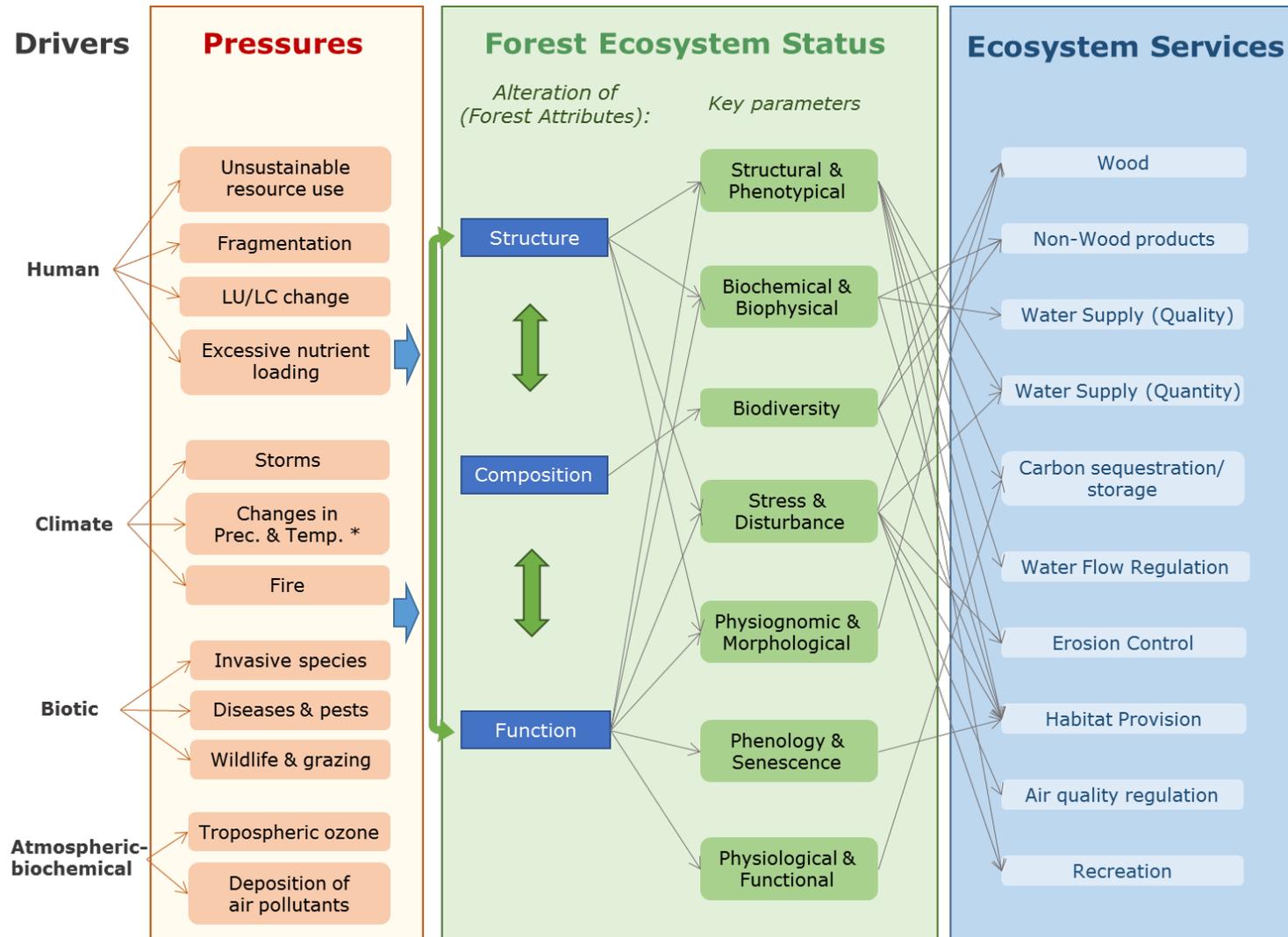
## Pressures:

Temporal and spatial scale of occurrence

In the diagram, pressures are described to occur sequentially, one after another, however, often they occur simultaneously in time or in time and space



# Analytical framework for forest condition (draft)



# Expected impact of pressures on forest ecosystem services (draft)

Ecosystem services	Pests and diseases	Invasive alien species	Storms	Climate change (including drought)	Fires	Air pollution	Fragmentation	LU/LC change	Unsustainable resource use	Excessive nutrient loading
Wood	●	●	●	●	●					
Non-wood products									●	
Water supply (quality)					●	●	●	●	●	●
Water supply (quantity)				●	●		●	●		
Carbon sequestration/storage					●			●	●	
Water flow regulation					●			●		
Erosion control			●		●				●	
Habitat provision		●	●	●	●	●	●	●	●	
Air quality regulation					●					
Recreation			●		●			●	●	

**Figure 5.** Examples of expected effects of pressures on forest ecosystem services. The information in the figure is not exhaustive, however it is useful for describing the most important qualitative effects (black circles). The figure can be complemented by the users with information at local level from specific case studies.

# Indicators of forest ecosystem condition (on-going)

B		C			D	E	F	G		H	I
PRESSURE INDICATORS											
Key parameters		Indicator	Spatial Scale			Datasets					
			Forest Stand	Landscape	Ecological Zones						
4	Storms	Forest damage	X	X	X	1) Extreme Wind Storms Catalogue ( <a href="http://www.europeanwindstorms.org">http://www.europeanwindstorms.org</a> ), 2) European Storms Catalogue ( <a href="http://www">http://www</a> )					
6	Changes in Precipitation & Temperature (including drought)	Climate Data	X	X	X	1) Climate datasets e.g. WorldClim, Chelsa, E-Obs, ERA, etc					
9	Fires	Number of fires Burnt area	X	X	X	1) Forest fires (EFFIS)					
12	Unsustainable resource use	Forest overuse	X	X	X	1) Forest statistics: NAI, harvest (NFI)					
14	Fragmentation	Connectivity Patchiness	X	X	X	1) SEBI013: fragmentation and connectivity (forest, natural/semi-natural areas) (FISE)					
17	LU/LC change	Forest cover changes Deforestation	X	X	X	1) Corine Land Cover (Copernicus), 2) Global forest change dataset (Hansen et al., 2013)					
19	Excessive Nutrient Loading	Total nitrogen in soil	X	X							

B		C			D	E	F	G		H	I
STATE INDICATORS											
Key parameters		Indicator	Spatial Scale			Datasets					
			Stand	Landscape	Ecological Zones						
41	Stress & Disturbance	Naturalness	X	X	X	Species and Habitat conservation status (Art.17 database) (EEA)					
42		Conservation status			X						
43		Soil moisture (water stress)	X	X	X						
44		Resource limitations	X								
45		Habitat quality	X	X							
46		Defoliation	X	X	X						
47		Descoloration	X	X	X						
48		Drought and heat induced tree mortality-drought-stress	X	X	X						
49	Biochemical & Biophysical	Pigment content (chlorophyll a b Carotene Xanthophyll)	X	X	X	Soil condition (LUCAS) Soil condition (LUCAS)					
50		Nitrogen	X	X	X						
51		Phosphorus content	X	X							
52		Lignin	X	X							
53		Cellulose	X	X							
54		Phenole	X	X							
55		Plant water content	X	X							
56		Wax Starch Sugar	X								
57		Carbon content	X	X							

B		C			D	E	F	G		H	I
FOREST BIODIVERSITY INDICATORS											
Key parameters		Indicator	Spatial Scale			Datasets					
			Stand	Landscape	Ecological Zones						
101	Biodiversity	Plant functional types		X	X	Relative area of protected forest (Natura 2000; CDDA; IUCN World database of protected areas)					
102		Protected forest area		X	X						
103		Species diversity (Alpha, beta, gamma)	X	X	X						
104		Species abundance	X	X	X						
105		Phylogenetic	X	X	X						
106		Forest tree species	X	X	X						
107		Forest types	X	X	X						
108		Seral diversity	X	X	X						
109		Genetic variability	X	X							
110		Threatened species	X	X							
111		Deadwood	X	X	X						
112		Understorey vegetation	X	X							
113		Common forest bird species			X						
114		Rove beetles	X	X							
115		Ground beetles	X	X							
116	Overall vascular plant	X	X	X							
117	Overall bryophyte	X	X	X							
118	Moss	X	X	X							
119	Liverwort	X	X	X							
120	Overall lichen	X	X	X							
121	Overall fungal	X	X	X							
122					1) SEBI 18 Deadwood (EEA) available at national level (Forest Europe) or European scale (SEBI018); 2) NFI data						
					SEBI 01 Abundance and distribution of selected species (woodland bird) (EEA) (index available at MS level)						

June 27 & 28, 2017, Brussels

TUE, JUN 27 AT 9:00 AM,  
Brussels, Belgium

# MAES Workshop: Assessing and Mapping Ecosystem Condition

by By the European Commission with the support of IUCN, UNEP-WCMC and IEEP

NEED AN INVITATION?

[CONTACT ORGANIZER](#)

[Use Eventbrite](#)

[How it Works](#)

[Pricing](#)

[Community Guidelines](#)

[Plan Events](#)

[Online Registration](#)

[Sell Event Tickets](#)

[Event Management Software](#)

[Find Events](#)

[Browse Brussels Events](#)

[Get the Eventbrite App](#)

[Connect With Us](#)

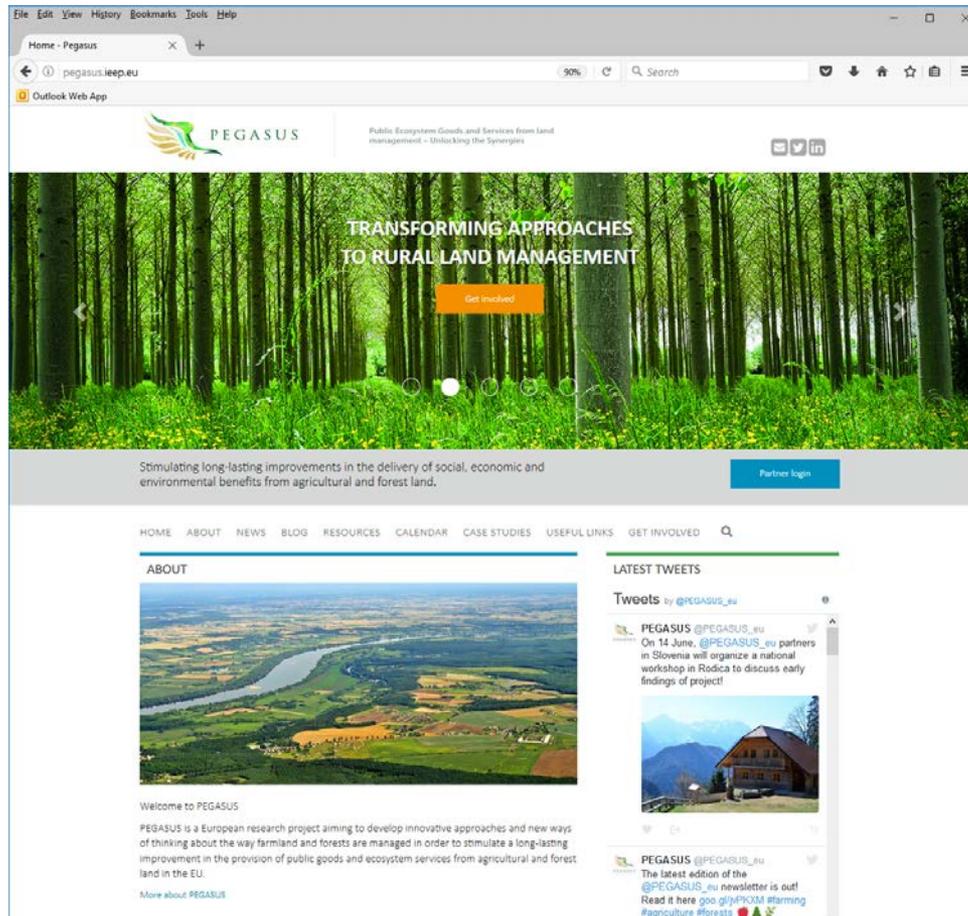
[Report This Event](#)

[Help Center](#)

[Terms](#)

Contact organizer: Anne Teller [[anne.teller@ec.europa.eu](mailto:anne.teller@ec.europa.eu)]

# Pegasus: Public Ecosystem Goods and Services from land management – Unlocking the synergies



<http://pegasus.iiep.eu/>

Horizon 2020 RTD project

14 partner organisations  
2015-2018

Coordinator IEEP:  
Kaley Hart  
WP-2 coordinator Alterra:  
Marta Pérez-Soba

WP-2: Mapping and assessment of current and potential PG/ESS provision in relation to the diversity of EU farming and forestry systems in the EU

# Task 2.3: patterns and trends of PG/ESS in relation to land management systems (JRC)

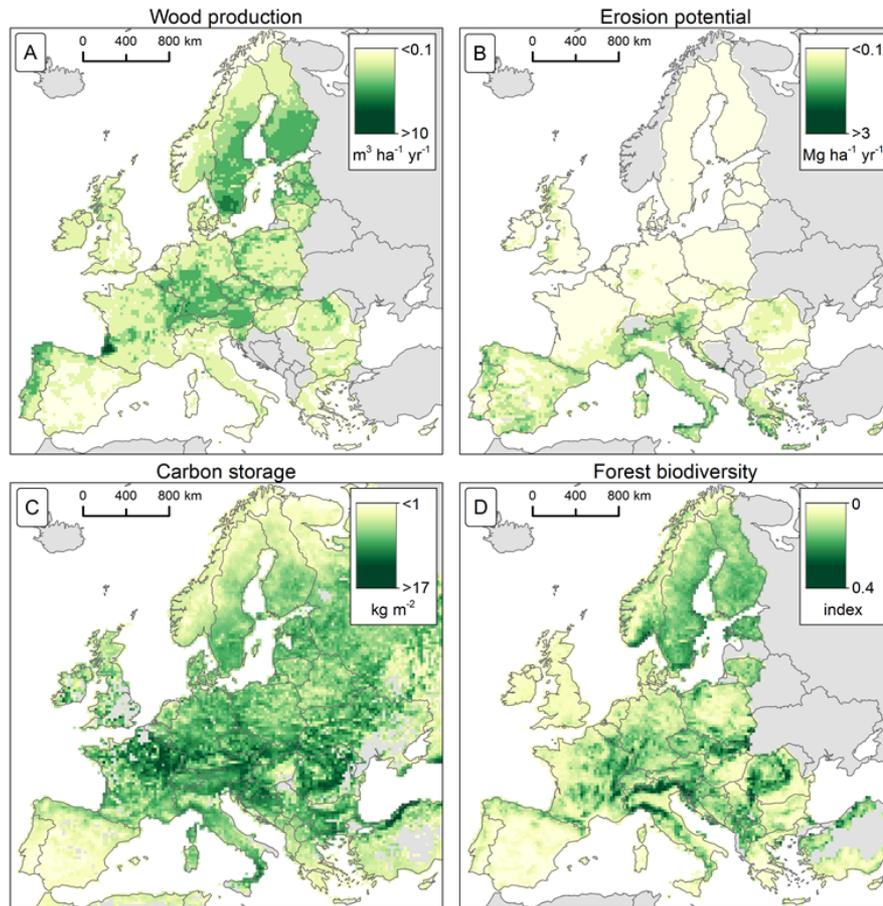


Figure 1. Proxies of forest ecosystem services. A) Wood production (source: Verkerk et al. 2015), B) Erosion potential (source: Borrelli et al. 2016), C) Carbon storage (source: Thurner et al. 2014), D) Forest biodiversity (tree species diversity) (source: de Rigo 2016). Note that the original maps, all at 1 km<sup>2</sup> grid size, were up-scaled (mean) to 25 km grid size for better readability in this figure.

# Task 2.3: Assessing forest ecosystem services per forest use intensity categories (JRC)

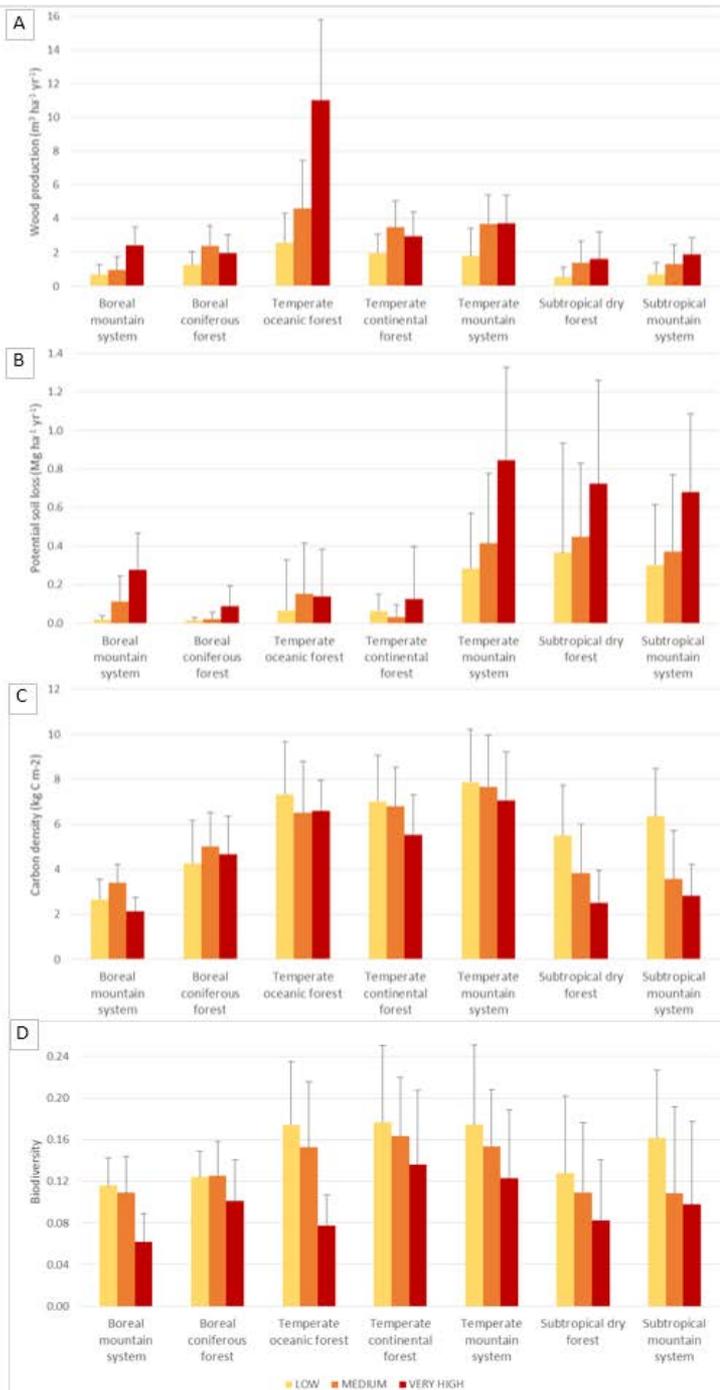
Average amount of ecosystem services per forest use intensity category on forest ecological zones. Error bars represent SD

A) Wood production

B) Erosion potential

C) Carbon stock

D) Forest biodiversity (tree species diversity)



# Task 2.3: Forest Management intensity (Alterra)

## Input data

Soil type (ISRIC)

Elevation (Copernicus)

Climate zone (Metzger et al)

IUCN protection status (IUCN-WPDA)

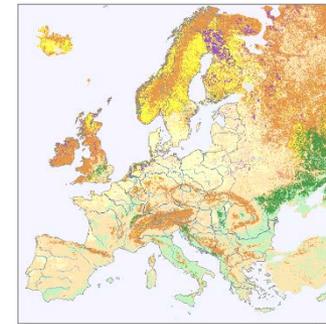
Tree species (JRC)

Size of fellings (clearcuts) (Hansen)

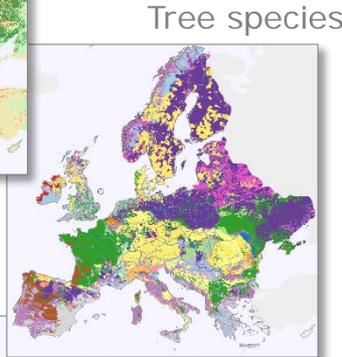
Ruggedness (based on Copernicus elevation)

Accessibility / population pressure (FAO –EU FP6)

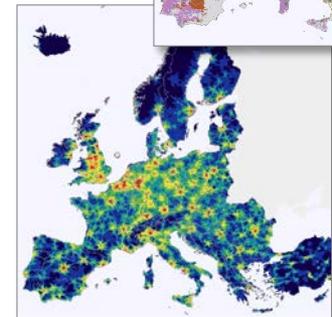
Percentage of forestry on the annual GDP (FAO-forestry statistics)



Soil type



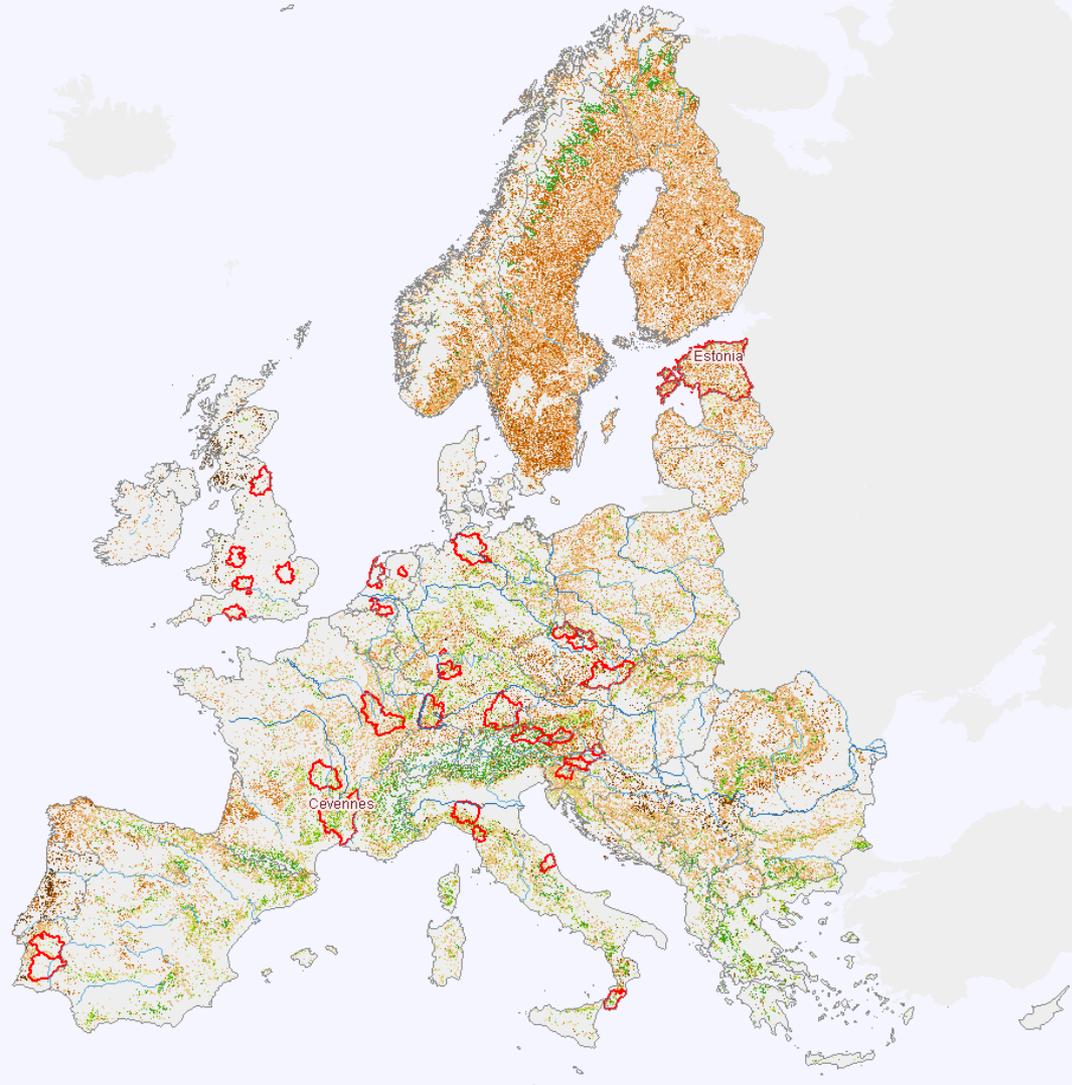
Tree species



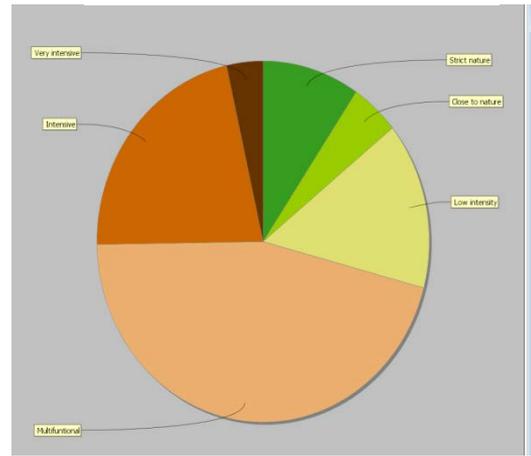
Accessibility

# Task 2.3: PEGASUS forestry management intensity patterns (Alterra)

## PEGASUS case studies in red



- Strict nature
- Close to nature
- Low intensity
- Multifunctional
- Intensive
- Very intensive
- No forest



pegasus.ieep.eu/resources-list 90% Search

Outlook Web App



Public Ecosystem Goods and Services from land management – Unlocking the Synergies

📧 🐦 🌐

HOME ABOUT NEWS BLOG RESOURCES CALENDAR CASE STUDIES USEFUL LINKS GET INVOLVED 🔍

Publications and Deliverables

Presentations

Videos

Case study material

Policy briefings

HOME > RESOURCES LIST

### PUBLICATIONS AND DELIVERABLES

Search

SEARCH

**Summary report on findings from the in-depth case studies – Steps 3-4 case study results - PEGASUS Deliverable 4.4**

This discussion paper presents the emerging findings and insights gained from the 12 PEGASUS in-depth case studies ("Steps 3-4") and their reports (Deliverable 4.3).

**In-depth case study reports - Steps 3 and 4 - PEGASUS Deliverable 4.3**

This report compiles the reports of the 12 in-depth case studies in ten different EU countries. In the "Steps 3 and 4" of the case study work, the PEGASUS teams carried out more in-depth analyses of the range of factors associated with the delivery of environmental and social benefits by agriculture and forestry, in different contexts across the EU.

**Innovative approaches for the provision of environmental and social benefits from agriculture and forestry – Steps 1-2 case study results - PEGASUS Deliverable 4.2**

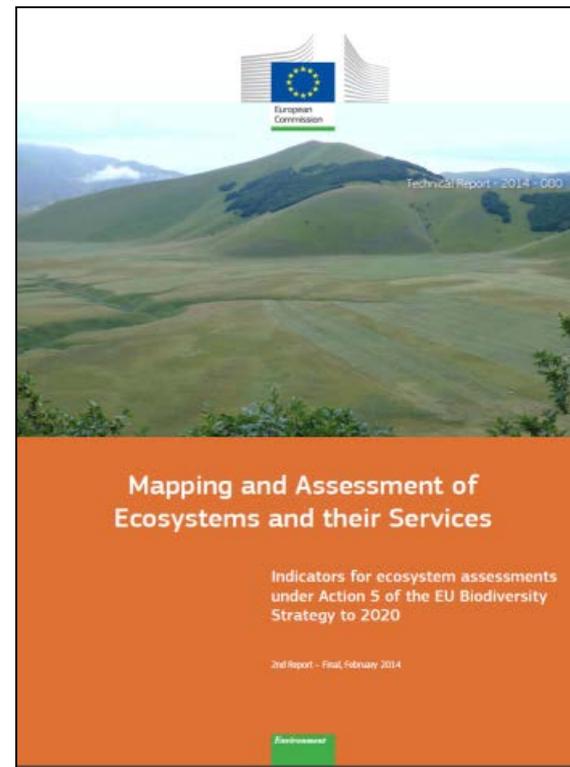
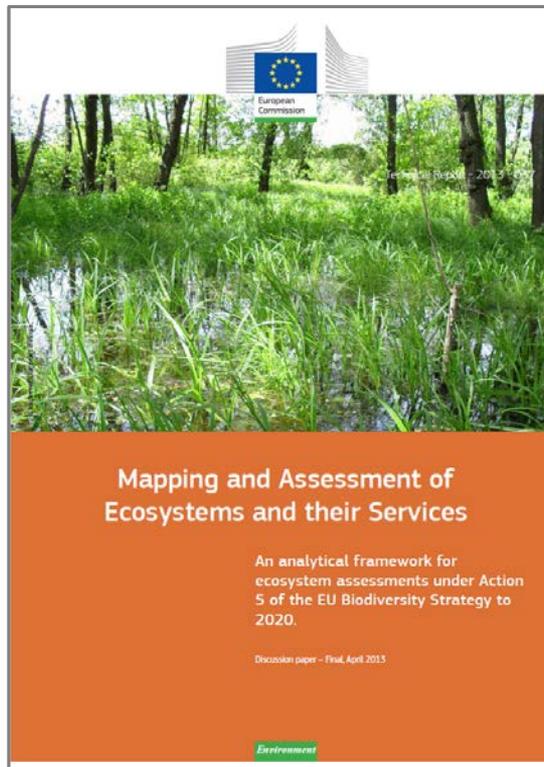
This discussion paper presents the main results and insights gained from the 34 PEGASUS broad and shallow case studies ("Steps 1-2"). It also presents our final selection of in-depth case studies as well as the main analytical questions to be explored in the subsequent steps ("Steps 3 and 4").

**Case study reports - Steps 1 and 2 - PEGASUS Deliverable 4.1**

This report compiles the reports of 34 case studies in ten different EU countries. In "Steps 1 and 2" of the case study work, the PEGASUS teams carried out analyses of issues and successful initiatives associated with the delivery of environmental and social benefits by agriculture and forestry across a wide range of broad and shallow case studies.

# Thank you

# MAES 1<sup>st</sup> and 2<sup>nd</sup> report



[http://ec.europa.eu/environment/nature/knowledge/ecosystem\\_assessment/index\\_en.htm](http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/index_en.htm)

# A framework for forest ecosystem services

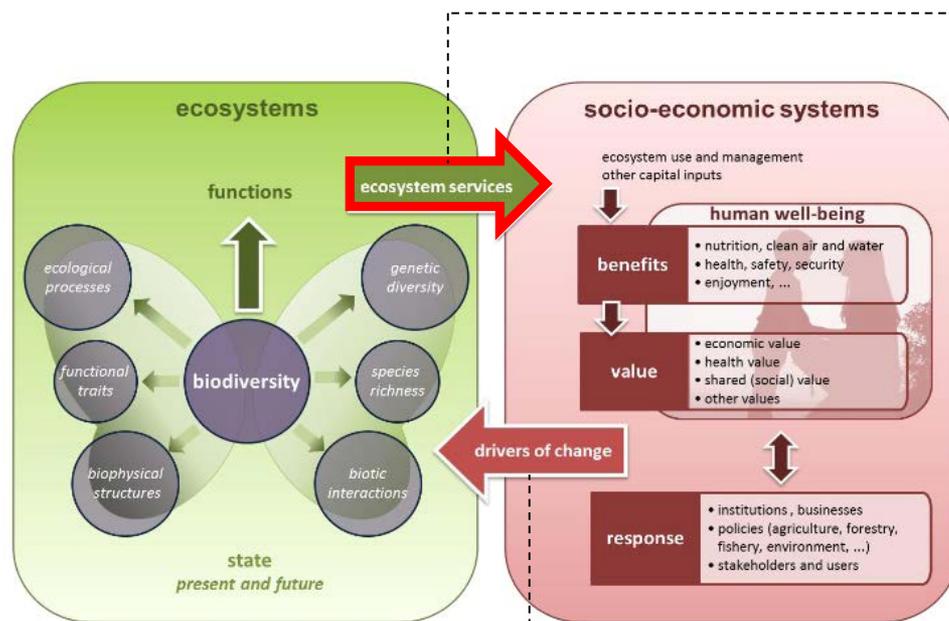


Figure 2. Conceptual framework for EU wide ecosystem assessments.

Forest ecosystem services are the benefits that people obtain from forest ecosystems. They are the direct and indirect contribution of forest to human wellbeing.

Driver of change is any natural or human-induced factor (including forest management) that directly or indirectly causes a change in a forest ecosystem.

The screenshot shows a web browser window displaying the European Commission's website. The page title is "Mapping and Assessment of Ecosystems and their Services - MAES". The header includes the European Commission logo and the word "ENVIRONMENT". A navigation menu lists "Home", "About us", "Policies", "Funding", "Legal compliance", and "News & outreach". A sidebar on the left contains links for "Nature and biodiversity", "Biodiversity Strategy", "Nature and biodiversity law", "Species protection", "Natura 2000", and "Knowledge and data". The main content area features a large heading "Mapping and Assessment of Ecosystems and their Services - MAES" followed by a sub-heading "In a nutshell" and a brief introductory paragraph. Below this, there is a section titled "In practice" which contains several paragraphs of text, including references to technical reports from 2013, 2014, and 2016, and a statement about Member States' involvement in the MAES process.

[http://ec.europa.eu/environment/nature/knowledge/ecosystem\\_assessment/index\\_en.htm](http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/index_en.htm)